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New synonymy in some Asian species of *Syrrhopodon* (Calymperaceae: Musci)

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SYNOPSIS. *Calymperes dixoconstrictum* B.C. Tan & Mohamed is placed in synonymy with *Syrrhopodon croceus* Mitt., and *Calymperes mussuriense* Dixon in synonymy with *Syrrhopodon gardneri* (Hook.) Schwägr. *Syrrhopodon subelimbatus* Dixon, hitherto erroneously regarded as a synonym of *Syrrhopodon trachyphyllus* Mont., is conspecific with *Syrrhopodon armatus* Mitt.

Syrrhopodon croceus Mitt. in *J. Linn. Soc., Bot.* Suppl. **1**: 41 (1859).
Fig. 1.

Calymperes constrictum Dixon in *Bull. Torrey Bot. Club* **51**: 233 (1924), hom. illeg.

Calymperes dixoconstrictum B.C. Tan & Mohamed in Mohamed & B.C. Tan, *Bryologist* **91**: 29 (1988), syn. nov. Type: Peninsular Malaysia, Selangor, Klang Watercatchment Forest, 12 March 1922, *Burkill 6836* (BM!-holotype).

DISCUSSION. Mohamed & Tan (1988) proposed '*Calymperes dixoconstrictum*' to replace the illegitimate *Calymperes constrictum* Dixon, a combination already published for a different species, i.e. *Calymperes constrictum* Sull. [= *Mitthyridium constrictum* (Sull.) H. Rob.]. Eddy (1990), without mention of Tan & Mohamed's new name, placed *C. constrictum* Dixon in synonymy with *Syrrhopodon loreus* (Sande Lac.) W.D. Reese. However, the holotype of *C. constrictum* (*Burkill* 6836), in Dixon's herbarium (BM), represents an extreme form of *Syrrhopodon croceus* Mitt. that possesses unusually poorly developed shoots and leaves.

In typical material of *Syrrhopodon croceus* Mitt. the leaves are < 5–10 mm long and consist of a narrowly subelliptical base, with entire margins, extending into a linear chlorophyllose limb with a blunt apex (Fig. 1a, c, e) and toothed margins. The hyaline lamina is confined to the proximal region of the base and has a truncate to broadly acute apex. Distally, the lamina in the leaf base is largely composed of thick-walled, porose, orange-red cells (Fig. 1j, k). For a short distance beyond the leaf base the margin usually possesses a row of long, acute teeth; above these, it thickens to form a prominent rib that extends to near the leaf apex. This is composed of stereids enclosed within a unistratose layer of subrectangular cells (Fig. 1l, m). Subtriangular teeth occur at intervals along the rib.

The holotype of *Calymperes constrictum* Dixon (*Burkill* 6836) has leaves which are mostly linear (reaching 5–6 mm long), but some are relatively broad and short with broadly acute apices (Fig. 1b, d), as illustrated by Dixon in the protologue. The hyaline lamina occupies the entire length of the leaf base and possesses an acute apex (Fig. 1h, i). Thick-walled, porose, orange-red cells are all but absent or occur in reduced patches on either side of the hyaline lamina in the upper leaf base (Fig. 1i). In the leaf limb marginal teeth are sometimes obscure or absent, and the layer of subrectangular cells enclosing the thick marginal rib is sometimes missing or poorly developed. All of these features are consistent with those occurring in depauperate, aberrant or juvenile forms of *Syrrhopodon croceus* Mitt. collected elsewhere in southeast Asia. Collections similar to *Burkill* 6836 have been made in the Philippines (*Tan & Tandang* 82-376, FH) and South Kalimantan (*Ellis* 252 pro parte, BO). The latter specimen occurred within a few meters of populations of *S. croceus* with the typical form.

SPECIMENS EXAMINED. **Malay Peninsula**. Negri Sembilan, Pasoh Forest Reserve, Smithsonian 50 Hectare Plot, tree number 62866, March 1995, *Ellis* s.n. (BM). **Philippines**. Luzon Island, Laguna Province, Cavinti, Bo. Lumot, Ubali River, near Sitio Ubali, 24 October 1982, *Tan & Tandang* 82-376 (FH). **Indonesia**. South Kalimantan, Panaan, 01° 36' 44" S, 115° 30' 00.5" E, 29 March 2000, *Ellis* 252 pro parte (BO). **Sarawak**. Fourth/Fifth Division, Gunong Mulu National Park, W. of Sungei Berar Camp, 150 m, 16 March 1978, *Jermy* 13664:13 (BM).

Syrrhopodon gardneri (Hook.) Schwägr., *Sp. musc. frond. suppl.* **2**(1): 110 (1824).

Calymperes mussuriense Dixon, *The 150th anniversary volume of the Royal Botanic Garden, Calcutta*, **1, 2**: 178 (1942), syn. nov. Type: India, Mussooree, Landour, near Woodstock School, 2 July 1922, *Dudgeon* 64 (BM!-holotype).

Syrrhopodon mussuriense Broth. in R.S. Chopra, *Taxonomy of Indian mosses*: 103 (1975), nom. nud. Original specimen: India, below Mussooree, 10 September 1895, *Duthie* s.n. (BM!, BM-K!).

DISCUSSION. Dixon labelled the type specimen of *Calymperes mussuriense* Dixon (*Dudgeon* 64, BM) as '*Syrrhopodon mussooriensis* Dixon, sp. nov.'. The material was never annotated with the published combination. Consequently, *Dudgeon* 64 and two paratypes of *C. mussuriense* (*Sawhney* 236, 250, BM) have hitherto remained unrecognized, and were filed in BM under the unpublished herbarium name. An undated pencilled note on *Dudgeon* 64 by R.S. Chopra correctly identifies it as a form of *Syrrhopodon gardneri* (Hook.) Schwägr.

Syrrhopodon mussuriensis Broth., nom. nud. is apparently based on another collection from Mussooree (*Duthie* s.n.). Coincidentally, the two duplicates of this specimen in BM are also *Syrrhopodon gardneri*.

SPECIMENS EXAMINED. **India.** Kumaon, Thall to Dindihat, June 1926, *Sawhney* 236 (BM), 250 (BM).

Syrrhopodon armatus Mitt. in *J. Linn. Soc., Bot.* **7**: 151 (1863).
Fig. 2.

Syrrhopodon subelimbatus Dixon in *J. Siam Soc., Nat. Hist. Suppl.* **9**(1): 12 (1932), syn. nov. Type: Thailand, Kaw Tao, 300 m, September 1928, *Kerr* 338 (BM!-holotype).

DISCUSSION. Mohamed & Reese (1985) and Menzel & Schultze-Motel (1990) place *Syrrhopodon subelimbatus* Dixon in synonymy

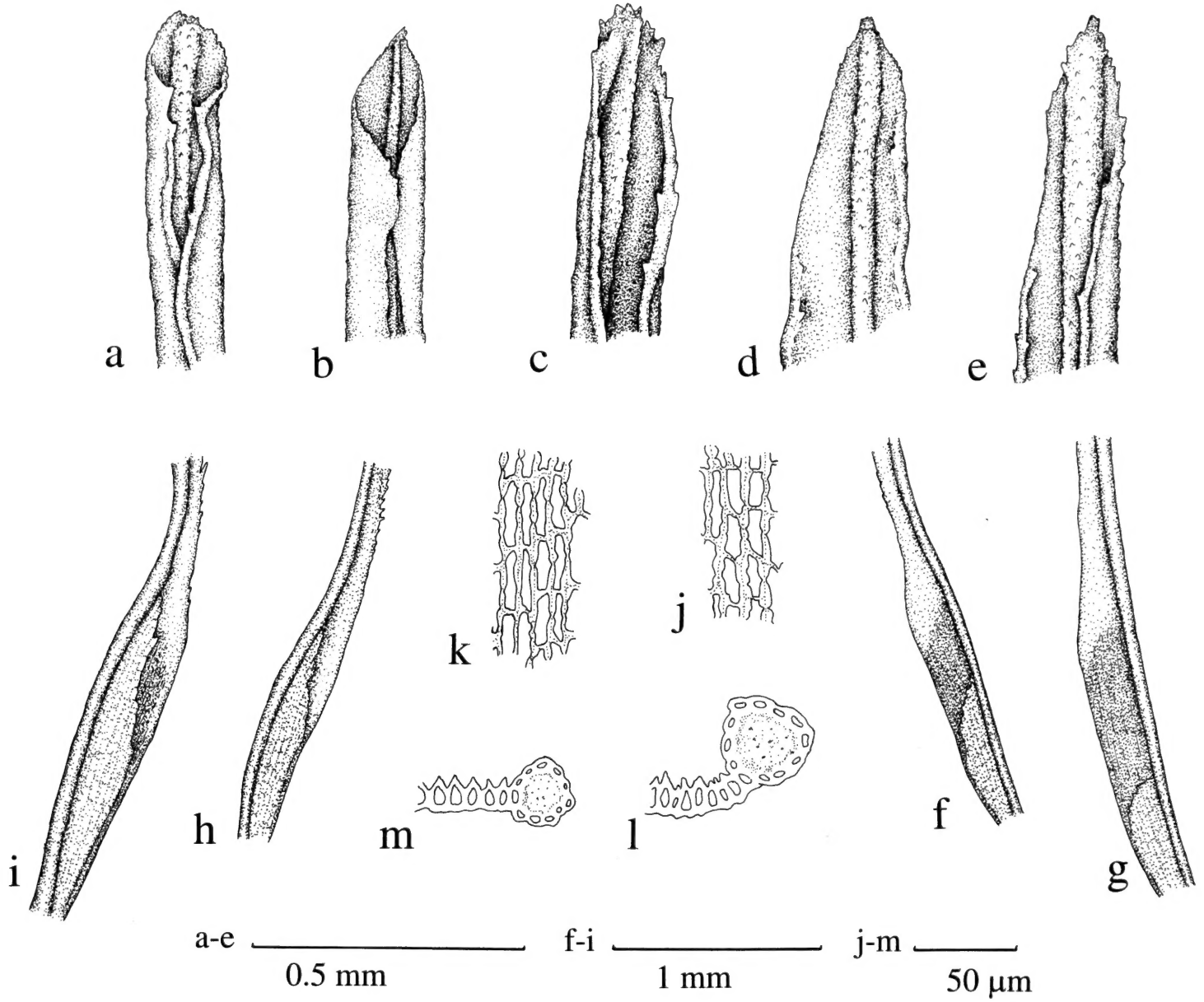

Fig. 1 a–m. *Syrrhopodon croceus* Mitt. a–e: apices of leaves in ventral view (a, c, e: normal leaves, b, d: aberrant leaves); f–i: basal regions of leaves in lateral view (f, g: typical leaves with prominent areas of orange-red cells (shaded areas), h, i: aberrant leaves with reduced to absent groups of orange-red cells); j, k: orange-red cells from distal leaf base (j: normal leaf, k: aberrant leaf): l, m: cross-section of chlorophyllose lamina and marginal rib in leaf limb (l: normal leaf, m: aberrant leaf). a, b, k, i, m Drawn from *Burkill* 6836 (BM); c, f, j Drawn from *Ellis* s.n. (BM); d, e, h Drawn from *Ellis* 252 pro parte (BO); g, l Drawn from *Jermy* 13664:13 (BM).

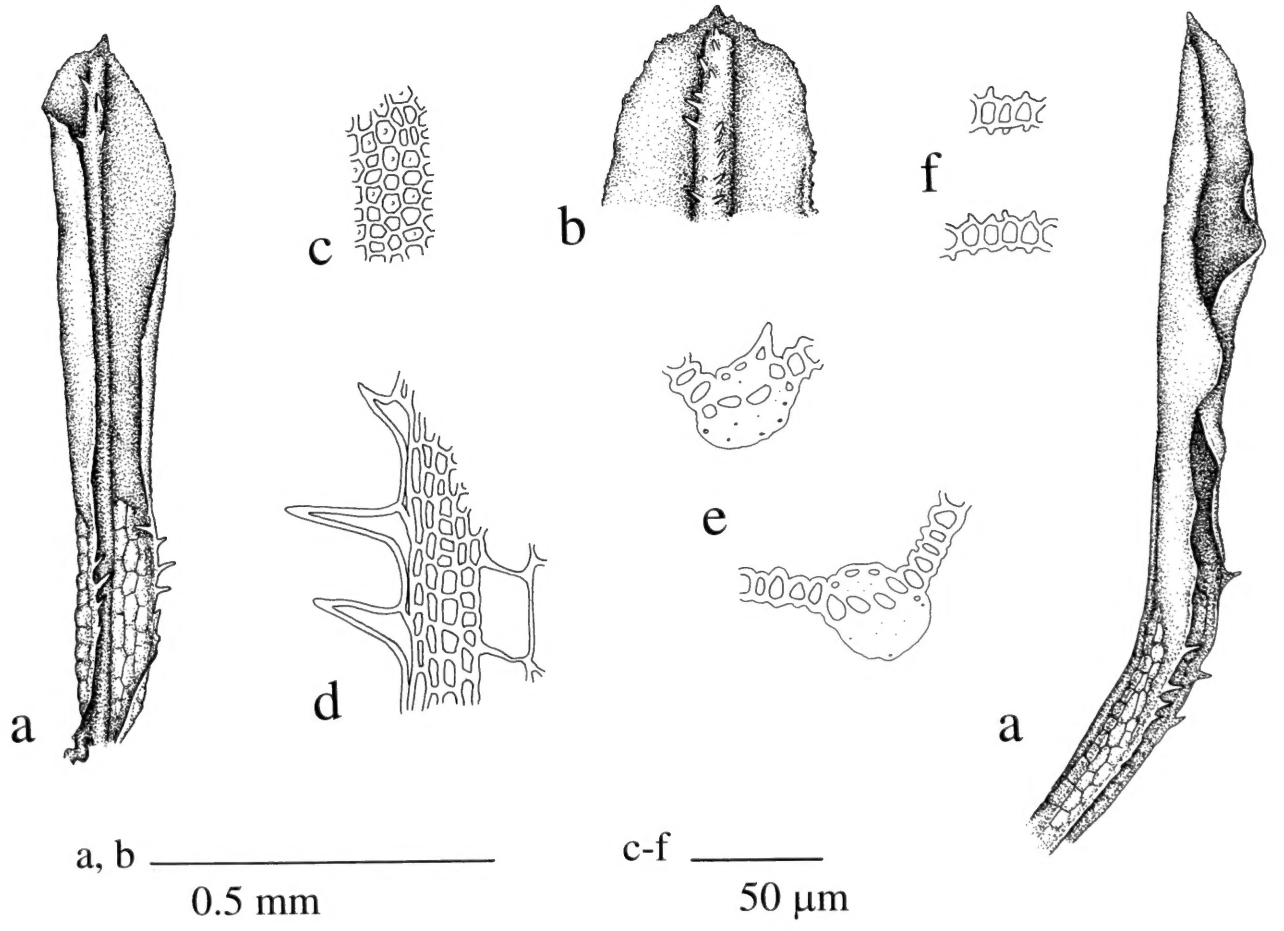

Fig. 2 a–f. *Syrrhopodon armatus* Mitt. a: leaves; b: leaf apex in ventral view showing costal spines; c, d: cells of leaf in surface view (c: chlorophyllose lamina, d: at margin adjacent to the apex of the hyaline lamina); e, f: cross-sections of leaf (e: costa and chlorophyllose lamina in distal leaf, f: chlorophyllose lamina with simple papillae). a–f Drawn from *Kerr* 338, BM.

with *Syrrhopodon trachyphyllus* Mont. However, the holotype material in Dixon's herbarium (*Kerr* 338, BM) represents a form of *Syrrhopodon armatus* Mitt. Tixier (1978) was correct to include *S. subelimbatus* in synonymy with *Syrrhopodon larminatii* Broth. & Paris, the latter now recognized as conspecific with *S. armatus*.

Leaves of specimens of *Syrrhopodon armatus* Mitt. usually possess costae with a partial to continuous superficial layer of chlorophyllose cells, many of which are drawn out as long spines. The cells forming the chlorophyllose lamina are very slightly ventrally protuberant and usually possess a simple papilla on the dorsal and ventral surfaces. In contrast, the leaves of *Syrrhopodon trachyphyllus* Mont. have the surface of the costa smooth and usually formed by stereids. Each cell of the chlorophyllose lamina possesses a crown of papillae on the dorsal and ventral surfaces.

Kerr 338 possesses leaves that more closely resemble those of *Syrrhopodon armatus* (Fig. 2a). Chlorophyllose cells, some drawn out as spines, form the ventral surface of the costa (Fig. 2b, e). However, in most leaves, the dorsal surface of the costa is formed by stereids, a few spines sometimes occurring towards the leaf apex. The cells of the chlorophyllose lamina are unipapillose (Fig. 2f) on the dorsal and ventral surfaces or lack papillae (Fig. 2e). These and all other features of *Kerr* 338 fall within the range of variation found in specimens of *Syrrhopodon armatus*.

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Two new species of *Pilea* (Urticaceae) from Panama

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SYNOPSIS. Two new species of *Pilea* from Panama are described and illustrated: *Pilea corona* A.K. Monro, which most closely resembles *P. acuminata* Liebm., and *P. digitata* A.K. Monro, which most closely resembles *P. fasciata* Wedd. The affinities of these species are discussed and their position within Weddell's subdivisions of the genus indicated.

INTRODUCTION

Pilea Lindl. is the largest genus in the Urticaceae and comprises over 600 species (Burger, 1977), distributed throughout the tropics, subtropics, and temperate regions (with the exception of Australia, New Zealand, and Europe). It is easily distinguished from other neotropical Urticaceae by the combination of opposite leaves and a single, ligulate, intrapetiolar stipule in each leaf axil.

In the course of preparing a revisionary account for *Flora Mesoamericana,* ten new species have already been described by the author (Monro, 1999, 2000) and a further two new species are described here. Their affinities are discussed and their position within Weddell's (1869) subdivisions of the genus indicated, which although not phylogenetic, are based on the most comprehensive worldwide treatment of the genus.

Pilea corona A.K. Monro, **sp. nov**. Type: Panama, Veraguas, 3 miles from Escuela de Agricultura Alto Piedra on road to Río Calovébra, along stream, 2400 ft, 7 October 1979, *Antonio* 2043 (PMA!-holotype; MO!-isotype).
Fig. 1A–C.

Species *P. acuminata* Liebmann similis, sed inflorescentiis staminalis non ramosus, stipulis minimis, differt.

Herb to 30 cm; epiphytic or epipetric. *Stems* erect or prostrate, drying dark brown, pubescent, the hairs to 1 mm, appressed, curved; cystoliths fusiform; internodes 7–31 × 1–4 mm, angulate or circular in cross-section. *Stipules* 3–5 mm, obovate or oblong, drying grey-brown. *Leaves* petiolate, petioles at the same node equal or unequal by ratio 1:1.5–4.0, major petiole 3–34 mm, pubescent, the hairs to 1 mm, appressed, curved or straight; laminas of leaves at the same node equal to subequal, 25–130 × 11–45 mm, elliptic, narrowly elliptic or lanceolate, chartaceous; upper surface drying dark brown to dark green, pubescent, the hairs to *c.* 0.8 mm, appressed, weakly curved, the cystoliths fusiform, 'V'- and 'Y'-shaped; lower surface drying grey-green to grey-brown, pubescent on veins only, the hairs to 1 mm, upright, curved or occasionally straight, glandular-punctate; primary venation 3-nerved, lateral nerves visible for 1/3 to 2/3 of the lamina length, secondary veins (4)8–16 pairs, 45–60° to the midrib, straight; base asymmetrical or symmetrical, cuneate, attenuate or decurrent; margins coarsely dentate, basal 1/10 to 1/8 entire; apex acute. *Inflorescences* 2–4 per stem, unisexual, occasionally bisexual, where bisexual dominated by a single sex; peduncular bracts 1.0–1.5 mm; bracts *c.* 0.5 mm. *Staminate inflorescences* solitary, 25–47 mm, bearing 15–50 flowers in a compact head; peduncle 2/3 to 3/4 inflorescence length, pubescent, the hairs to 1.5 mm, appressed, straight; pedicels 2.5–4.0 mm, glabrous or pubescent, the hairs to *c.* 0.5 mm, erect, crisped; flowers 3.0–3.5 × 1.0–1.3 mm immediately prior to anthesis, cream to brown; tepals 4, 1.0–1.3 mm, glabrous, occasionally pubescent, the hairs to *c.* 0.5 mm, erect, crisped, the subapical appendage 1.8–3.3 mm, linear, pubescent, the hairs to 1 mm, erect, crisped; stamens 4. *Pistillate inflorescences* solitary per axil, 3–10 mm, bearing 20–60 flowers in a compact head; peduncle 1/3 to 1/2 inflorescence length, glabrous or sparsely pubescent, the hairs to *c.* 0.8 mm, appressed, curved; pedicels 0.4–0.7 mm, glabrous; dorsal tepal 0.5–0.7 mm, oblong to obovate, the dorsal tepal appendage *c.* 0.3 mm, scale-shaped; lateral tepals 0.5–0.7 mm, asymmetrically ovate. *Infructescences* 14–27 mm; fruit 1.0–1.4 mm, compressed, asymmetrically elliptic, the margin narrow.

DISTRIBUTION. This species is endemic to the provinces of Chiriquí and Veraguas in western Panama. It is found at elevations of 700–1200 m in wet forest.

MATERIAL EXAMINED. **PANAMA. Chiriquí**: SE of Fortuna Lake, near mouth of Río Hornito, 8°45'N 82°13'W, 1150 m, *Hampshire & Whitefoord* 318 (BM). **Veraguas**: above Santa Fe beyond Escuela Agrícola Interamericana, 1.8 miles beyond fork in road on Pacific slope, above rocky ravine on side of Cerro Tute, *Croat* 34207 (MO); Río Segundo Brazo, 700 m, *Maas & Dressler* 1621 (F, MO); vicinity of Escuela de Agricultura Alto Piedra near Santa Fe, *c.* 1 hour walk along road beyond school, 900 m, *Antonio* 2984 (MO); vicinity of Escuela de Agricultura Alto Piedra near Santa Fe, 3 miles beyond fork in road near the school toward Atlantic coast, near trail to top of Cerro Tute, 700 m, *Antonio* 3537 (MO); vicinity of Escuela de Agricultura Alto Piedra near Santa Fe, along trail to top of Cerro Tute, 700 m, *Antonio* 4043 (MO); mountains W. of Alto de Piedras, Siclo Basico school N. of Santa Fe, 700 m, *Hammel* 4648 (MO, NY); forest at base of Cerro Tute, 6.5 km outside Santa Fe, *Folsom* 3057 (MO); N. of Santa Fe on property of Escuela Agricola Alto de Piedra, *Mori & Kallunki* 2521 (NY); NW of Santa Fe, 8.8 km from Escuela Agricola Alto de Piedra, Pacific slope, *Mori* et al. 3911 (NY).

Pilea corona falls into Weddell's *Dentatae* species group (Weddell, 1869) in having equal-sized, toothed leaves at each node. Material of this species has previously been determined as *P. acuminata* Liebm., which it closely resembles, but although both species occur in Panama, *P. acuminata* is known only from Coclé Province which lies to the east of the area from which *P. corona* is known. The two taxa may be distinguished on staminate inflorescence arrangement and stipule size, as summarized below.

Pilea acuminata: stipules 7–20 mm; staminate inflorescences with (15–25)50–200 flowers borne in 5–30 compact heads arranged in a loose panicle, peduncle (1/4)1/3 to 1/2(3/4) inflorescence length.

Pilea corona: stipules 3–5 mm; staminate inflorescences with 15–50

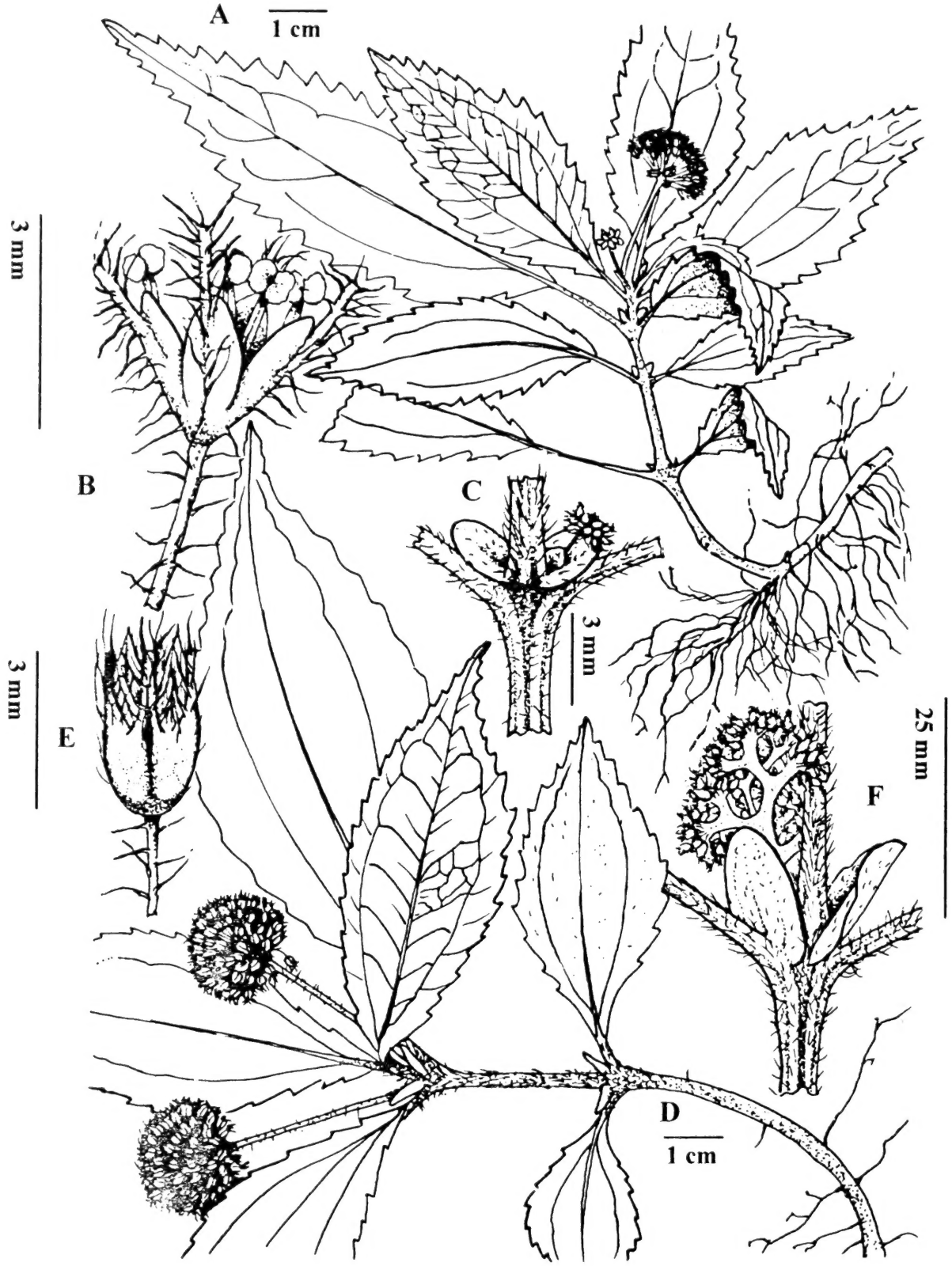

Fig. 1 A–C. *Pilea corona* (*Antonio* 2043, MO). A. Fertile branch with staminate inflorescence and infructescence; B. Staminate flower at anthesis; C. Pistillate inflorescence and stipule. D–F. *Pilea digitata* (*Hampshire & Whitefoord* 694, BM). D. Fertile branch; E. Staminate flower immediately prior to anthesis; F. Pistillate inflorescence.

flowers borne in a single compact head, peduncle 2/3 to 3/4 inflorescence length.

The species epiphet refers to the staminate flowers immediately prior to anthesis, at which time the tepal appendages give the flower the appearance of a crowned head.

Pilea digitata A.K. Monro, **sp. nov**. Type: Panama, Chiriquí, trail W. from Fortuna Dam camp to La Fortuna, 8°43'N 82°14'W, 1300 m, 28 February 1985, *Hampshire & Whitefoord* 189 (PMA!-holotype; BM!-isotype).
Fig. 1D–F.

Species *P. fasciata* Weddell similis, sed inflorescentiis staminalis non ramosus, floribus staminalibus majoribus, differt.

Herb to 50 cm; terrestrial. *Stems* erect, prostrate at base, drying dark brown, densely pubescent, the hairs to 1.5 mm, erect or weakly appressed, curved; cystoliths fusiform; internodes 10–85 × 2.5–6.0 mm, angulate in cross-section. *Stipules* 3.0–10.5 mm, obovate to oblong, drying dark brown. *Leaves* petiolate, petioles at the same node unequal by ratio 1:1.5–3.5, the major petioles 6–30 mm, densely pubescent, the hairs to 1.3 mm, weakly appressed or erect, curved or straight, the minor petioles 5–20 mm; laminas of leaves at the same node equal, 40–130 × 17–70 mm, obovate to rhomboid to broadly elliptic, chartaceous, occasionally bullate; upper surface drying dark brown to dark green, pubescent, the hairs to 2 mm, erect or appressed, weakly curved, the cystoliths fusiform and 'V'-shaped, occasionally 'Y'-shaped; lower surface drying grey-green, densely pubescent on veins only, the hairs to 1 mm, erect, curved or occasionally straight, glandular-punctate; primary venation 3-nerved, lateral nerves visible for 1/2 to 2/3 of the lamina length, secondary veins 8–26 pairs, 60–75° to the midrib, straight to weakly curved; base asymmetrical or symmetrical, cuneate or obtuse, occasionally decurrent; margins serrate, basal 1/10 to 1/5 entire; apex cuspidate. *Inflorescences* 2–6 per stem, unisexual; peduncular bracts 1.8–3.0 mm; bracts 1.0–1.5 mm. *Staminate inflorescences* solitary, 20–60 mm, bearing 30–200 flowers in a compact head; peduncle 1/2 to 3/4 inflorescence length, densely pubescent, the hairs to 1.5 mm, appressed or erect, curved or occasionally crisped; pedicels 2.5–7.0 mm, glabrous, occasionally pubescent, the hairs to *c*. 0.5 mm, erect, crisped; flowers 2.5–3.5 × 1.0–1.3 mm immediately prior to anthesis, cream and green; tepals 4, 1.3–1.8 mm, glabrous, occasionally pubescent, the hairs as for pedicel, the subapical appendage 1–2 mm, linear, frequently reflexed, pubescent, the hairs to 1.5 mm, erect or appressed, curved, occasionally straight; stamens 4. *Pistillate inflorescences* solitary, 12–24 mm, bearing 45–100 flowers in a loose panicle; peduncle 1/2 to 2/3 inflorescence length, glabrous or pubescent, the hairs to *c*. 0.5 mm, erect, crisped or curved; pedicels *c*. 0.5 mm, glabrous; dorsal tepal 0.7–1.0 mm, oblong, the dorsal tepal appendage 0.4–0.5 mm, obovate to oblong; lateral tepals 0.5–0.7 mm, asymmetrically ovate. *Infructescences* 13–35 mm; fruit 1.5 mm, compressed, asymmetrically elliptic, the margin narrow.

DISTRIBUTION. This species is endemic to the provinces of Bocas del Toro, Chiriquí, Coclé, and Darien in Panama. It is found at elevations of 700–1700 m in wet forest.

MATERIAL EXAMINED. **PANAMA**. **Bocas del Toro**: along Continental Divide from road branching north off main Fortuna-Chiriquí Grande highway near Continental Divide, 1.1 miles from main highway, 8°44'N 82°17'W, 1200 m, *Croat & Grayum* 60315 (BM, MO); vicinity of Fortuna Dam, 8°40'04"N 79°50'04"W, 850–900 m, *McPherson* 10550 (MO). **Bocas del Toro/Chiriquí border**: Continental Divide above Quebrada Arena, carretera del Oleoducta, IRHE Fortuna Hydroelectric Project, 1150–1200 m, *Knapp & Vodicka* 5639 (MO). **Chiriquí**: road between Fortuna Lake and Chiriquí Grande, 4.5–5 km N. of dam over Fortuna Lake, 8°43'N 82°17'W, 1100–1135 m, *Croat & Grayum* 60041 (MO); road between Gualaca and Fortuna Dam site, 8.3 miles NW of Los Planes de Hornito, 8°44'N 82°16'W, 1260 m, *Croat* 49935 (BM, MO); Distrito Boquete, Fortuna Dam site, along trail following Continental Divide, 1100 m, *van der Werff & van Hardeveld* 6721 (MO); Distrito Boquete, Fortuna Dam site, Continental Divide, 1100 m, *van der Werff & van Hardeveld* 6798 (MO); La Fortuna Dam site, 9.4 miles beyond entrance to Finca Linares, 20.9 miles from bridge to Río Estí, 1400 m, *Antonio* 2833 (MO); road between Gualaca and Fortuna Dam site, 8.3 miles NW of Los Planes de Hornito, 1260 m, *Antonio* 4162 (MO); road between Gualaca and Fortuna Dam site, 8.3 miles NW of Los Planes de Hornito, 1260 m, *Antonio* 4163 (BM, MO); La Fortuna Hydroelectric project, ridge top N. side of river, *c*. 1200 m, *Hammel* 2191 (MO); E. del campamento Bijao-Fortuna, *Mendoza* et al. 264 (US); between Los Planes de Hornito and Fortuna Lake, trail to Zarzo, 8°41'N 82°13'W, 1200 m, *Hampshire & Whitefoord* 694 (BM, PMA); Fortuna Dam, above Gualaca, 8°45'N 82°15'W, 1200 m, *McPherson* 6710 (MO). **Coclé**: E. of El Copé sawmill along small stream, 700 m, *Hammel 3578* (MO). **Darien**: Pirre Massif, Alturas de Nique, above Cana mine, 7°45'N 77°40'W, 1250–1500 m, *McPherson* 12205 (MO); Cana-Cuasi trail, Chipigana District, 1700 m, *Terry & Terry* 1563a (F, GH, MO); N. slopes of Cerro Pirre, 700–950 m, *Mori & Kallunki* 5478 (MO); Cerro Campamento (S. of Cerro Pirre), *Duke* 15671(2) (MO); Cerro Pirre, 800–1400 m, *Duke & Elias* 13698 (MO); Cerro Pirre, ridge top and slope from Rancho Frio to Rancho Plastico, 800–1200 m, *Folsom* 4204 (MO); Coasi-Cana trail, between Cerro Campamento and La Escalera to 'Paramo', E. of Tres Bocas, *Kirkbride & Duke* 1336 (MO, NY); summit of Cerro Pirre, 1000–1400 m, *Gentry & Clewell* 7112 (MO); vicinity of Cerro Tacarcuna summit camp, along stream N. of camp, 1550–1650 m, *Gentry & Mori* 14056 (F, MO).

This species falls into Weddell's (1869) *Dentatae* species group in having equal-sized, toothed leaves at each node. Material of *Pilea digitata* has previously been determined as *P. fasciata* Wedd., *P. latifolia* Wedd., and *P.rugosissima* Killip, all of which occur in Chiriquí Province. Of these it resembles only *P. latifolia* and *P. fasciata*, the latter closely. *Pilea digitata* is easily distinguished from *P. latifolia* by the pubescent upper surface of the leaf lamina. It may be distinguished from *P. fasciata* on staminate inflorescence arrangement and flower size, and pistillate inflorescence flower number, as summarized below.

Pilea fasciata: staminate inflorescences with flowers borne in a loose panicle, flowers 1.3–1.8 mm; pistillate inflorescences bearing 100–280 flowers.

Pilea digitata: staminate inflorescences with flowers borne in a single compact head, flowers 2.5–3.5 mm; pistillate inflorescences bearing 45–100 flowers.

The species epiphet refers to the tepal appendages of the staminate flowers which, because of their rounded apex, resemble fingers.

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Synopsis of Mesoamerican *Pilea* (Urticaceae), including eighteen typifications and a key to the species

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CONTENTS

SYNOPSIS. A key to the Mesoamerican taxa of *Pilea* is presented together with a nomenclatural revision of 85 names, of which 18 are typified here: *P. brittoniae* Urb., *P. centradenoides* Seem., *P. cornuto-cucullata* Cufod., *P. forgeti* N.E. Br., *P. hyalina* Fenzl, *P. imparifolia* Wedd., *P. involucrata* (Sims) Urb., *P. latifolia* Wedd., *P. lundii* Liebm., *P. microphylla* var. *peregrina* (Griseb.) Urb., *P. nummulariifolia* (Sw.) Wedd., *P. ovalis* Griseb., *P. ptericlada* Donn. Sm., *P. pubescens* Liebm., *P. rubiifolia* Blume, *P. rupicola* Wedd., *P. trianaeana* Wedd., and *P. vulcanica* Liebm. A list of material examined with determinations is appended.

INTRODUCTION

With over 600 species (Burger, 1977), *Pilea* Lindl. is the largest genus in the Urticaceae and one of the larger genera in the Urticales. It is distributed throughout the tropics, subtropics and temperate regions (with the exception of Australia, New Zealand and Europe) and easily distinguished from other neotropical Urticaceae by the combination of opposite leaves and a single ligulate intrapetiolar stipule in each leaf axil.

Pilea was first described by Lindley in 1821 using *Pilea muscosa* Lindl., a superfluous name for *P. microphylla* (L.) Liebm., as its type. This species was introduced as a greenhouse exotic in the early nineteenth century. Prior to Lindley's description there had been disagreement as to where it should be placed, with Linnaeus (1759) placing it in *Parietaria* L. and Swartz (1797) and Willdenow (1805) placing it in *Urtica* L. Little more than 30 years later Weddell, in his comprehensive revisions of the genus in 1856–1857 and 1869, had identified 159 taxa in three major subgeneric groupings, many of these taxa having been originally placed in *Urtica* by their authors.

Pilea has attracted little monographic attention since Weddell's monographs but the genus has attracted significant contributions from localized treatments (Killip, 1939; Standley & Steyermark, 1952; Adams, 1972; Burger, 1977 and Chen, 1982) and by 1997 a further 562 names and 17 major subgeneric groupings had been published (Anon., 1997).

For the purpose of this synopsis, the definition of Mesoamerica is that used in *Flora Mesoamericana* (Davidse et al., 1994), a region bounded to its north by the Mexican states of Yucatán, Campeche, Tabasco, Quintana Roo and Chiapas, and to its south by Panama. This represents the closest geopolitical delimitation of the Mesoamerican phytogeographical region. Within Mesoamerica there are 85 names for 56 recognized taxa of *Pilea* and there is significant confusion over the application of many names. Combined with a lack of regional keys, and the similarity of form and habit within the genus, the determination of collections can be very difficult and has resulted in a significant proportion of herbarium material from Mesoamerica being misidentified. As more names are published (there are currently over 800 (*Index Kewensis*, 1997)) so the logistical problems of undertaking a monographic revision grow, and the classification of the genus has become more problematic. Whether or not *Pilea* is the subject of a global monographic revision in the near future, it is felt that the preparation of an identification key and nomenclatural review for Mesoamerican *Pilea* would be a useful first step in addressing some of the problems encountered whilst dealing with this genus for *Flora Mesoamericana* and would help provide a foundation for future work on neotropical *Pilea*.

In this treatment types are cited with the country of origin, collector name and number and the herbaria from which material has been seen. However, where types are designated here, all of the label locality information available, and the date of collection is included. Distributions for each species are given to country level within Mesoamerica, with the exception of Mexico and species which are only known from a single country, where they are given to state level. Global distributions are given to regional level e.g. South America, West Indies etc., following *Flora Mesoamericana* protocols (Davidse et al., 1994).

MATERIALS AND METHODS

The nomenclatural revision was based on the examination of the original published descriptions, type material for all 85 names, and all Mesoamerican material available on loan from BRU, C, F, GH, ITIC, K, LL, MEXU, MO, NY, P, PH, PMA, SCZ, TEX, and US. In

addition, material of related species from outside Mesoamerica, and from areas adjacent to Mesoamerica (e.g. Oaxaca and Veracruz in Mexico) was obtained, with the result that 2064 collections were examined and determined, 1748 of them from Mesoamerica. Of the 85 names included in this study, type material is known to have been destroyed for only one species (*Pilea cornuto-cucullata* Cufod.), and in this case a photograph of the holotype exists. Where it was felt that the existing type material was ambiguous, e.g. in the case of *Pilea nummulariifolia* (Sw.) Wedd. where the type element was an illustration, then an epitype was selected.

As the number of species described in *Pilea* has grown, so have the characters used to delimit species in the genus. The most frequently used macromorphological characters used by previous authors have been: leaf isomorphy and margin morphology, staminate inflorescence arrangement, staminate flower division and staminate tepal appendage morphology, stipule morphology, cystolith arrangement in the leaves, and fruit size. In this study, emphasis was also placed on pistillate inflorescence arrangement, pistillate flower size and dorsal tepal morphology, and stem morphology. All material was examined using a stereo microscope at ×64 to ×400 magnification and up to 71 observations were made for each specimen sampled. These observations were then used as a guide to delimiting taxa and in the preparation of the identification key. The key to the species was prepared using herbarium specimens and the observations made for each species; it was then tested in the herbarium on the loan material and collections at BM, and on the collections present at GH and P in 1999.

Many of the characters used in this key are very small and it may be necessary to make measurements +/– 0.1 mm; a dissecting microscope (to ×200) is therefore recommended. The terminology used for the description of leaf shape is based on that in Stearn (1992). Because of their small size and large number, it is usually fairly easy to find well preserved flowers on herbarium specimens.

TAXONOMIC TREATMENT

Key to the species

1 Leaves pectinate ..... 40. **P. pteridophylla**

– Leaves entire, serrate, crenate or sinuate, but never pectinate 2

2 Leaves sinuate ..... 52. **P. trichomanophylla**

– Leaves entire, serrate or crenate 3

3 Leaves 4–6 at each node, verticillate ..... 49. **P. senarifolia**

– Leaves 2 at each node, opposite 4

4 Stipules generally more than 2 mm long, prominent (clearly visible to the naked eye), auriculate, cordiform, ovate, oblong or obovate, occasionally caducous 5

– Stipules generally less than 2 mm long, evident to obscure (not clearly visible to the naked eye), deltate or broadly ovate 42

5 Leaf margin entire 6

– Leaf margin serrate or crenate, at least towards the leaf apex 7

6 Stipules auriculate; upper leaf surface densely pubescent, the hairs to 1.3 mm long ..... 29. **P. lindeniana**

– Stipules narrowly ovate to ovate; upper leaf surface glabrous to sparsely pubescent, where pubescent the hairs to 2.3 mm long ..... 36. **P. parietaria**

7 Upper leaf surface glabrous 8

– Upper leaf surface pubescent 26

8 Petioles winged.. 9

– Petioles unwinged.. 10

9 Stipules 2–6 mm long, ovate; upper leaf surface frequently with 'V'-shaped cystoliths ..... 26. **P. irrorata**

– Stipules 6–23 mm long, obovate or oblong; upper leaf surface lacking 'V'-shaped cystoliths ..... 41. **P. pteropodon**

10 Leaves of unequal length in pair, the ratio of smaller to larger > 1:1.5 11

– Leaves of equal or subequal length in pair, if subequal then the ratio of smaller to larger < 1:1.5 12

11 Petioles pubescent; leaf margin deeply serrate, the teeth weakly ascending ..... 6. **P. centradenoides**

– Petioles glabrous; leaf margin weakly serrate, the teeth strongly ascending ..... 12. **P. costaricensis**

12 Lower surface of leaves pubescent. 13

– Lower surface of leaves glabrous 20

13 Petioles glabrous ..... 10. **P. cornuto-cucullata**

– Petioles pubescent 4

14 Leaf margin entire from the base for ≥ 1/2 of the leaf length 15

– Leaf margin entire from the base for ≤ 1/3 of the leaf length 16

15 Secondary leaf veins 5–9 pairs, 30–65° to the midrib; stipules 2.5–5 mm long; staminate inflorescence < 10 mm long ..... 25. **P. involucrata**

– Secondary leaf veins 7–16 pairs, 60–75° to the midrib; stipules 5–14 mm long; staminate inflorescence > 30 mm long ..... 19. **P. forgeti**

16 Secondary leaf veins 4–6 pairs; lower surface of leaves eglandular; staminate flowers 3-parted; fruit ≥ 2 mm long ..... 54. **P. tripartita**

– Secondary leaf veins 6–28 pairs; lower surface of leaves glandular-punctate; staminate flowers 4-parted; fruit ≤ 1.5 mm long 17

17 Leaves lanceolate or narrowly elliptic, or sometimes falcate; lateral veins visible for over 3/4 of the leaf length; staminate inflorescences < 15 mm long ..... 34. **P. pallida**

– Leaves ovate, elliptic, broadly elliptic, rhomboid, obovate, but never falcate; lateral veins visible for 2/3–3/4 of the leaf length; staminate inflorescences >15 mm long 18

18 Leaf base cordate or occasionally subcordate; stipules widest at or below the midpoint; staminate flowers borne in 1–3 compact heads ..... 37. **P. pittieri**

– Leaf base acute, cuneate, decurrent, obtuse, subcordate or cordate; stipules widest at or above the midpoint; staminate flowers borne in loose panicles, or in 5 or more compact heads borne in a loose panicle 19

19 Leaves oblanceolate, rhomboid or elliptic; stipules 3–6 mm long; secondary leaf veins 60–90° to the midrib; subapical appendage of staminate tepals 1.3–1.5 mm long ..... 28. **P. latifolia**

– Leaves ovate to elliptic; stipules 7–20 mm long; secondary leaf veins 35–45° to the midrib; subapical appendage of staminate tepals 0.3–0.5 mm long ..... 1. **P. acuminata**

20 Petioles pubescent, the hairs short, curved and appressed (frequently difficult to see with the naked eye) 21

– Petioles glabrous 22

21 Leaves 63–235 mm long, with 13–28 pairs of secondary veins 60–80° to the midrib ..... 34. **P. pallida**

– Leaves 6.5–47 mm long, with 3–7 pairs of secondary veins 30–45° to the midrib ..... 4. **P. auriculata**

22 Upper surface of leaves variegated, the variegation visible when dry ..... 5. **P. cadierei**

– Upper surface of leaves never variegated, or if so, the variegation not visible when dry 23

23 Leaf margin entire from the base for ≥ 2/3 of the leaf length, thereafter remotely crenat ..... 2. **P. adamsiana**

– Leaf margin entire from the base for ≥ 2/3 of the leaf length, thereafter serrate, crenate or serrate-crenate 24

24 Leaves obovate ..... 19. **P. forgeti**

– Leaves ovate, lanceolate or elliptic 25

25 Upper surface of leaves drying bright green, yellow-green or occasionally pale brown ..... 45. **P. quercifolia**

– Upper surface of leaves drying dark brown, almost black ..... 10. **P. cornuto-cucullata**

26 Leaves of unequal length in pair, the ratio of smaller to larger > 1:1.5 27

– Leaves of equal or subequal length in pair, where subequal the ratio of smaller to larger < 1:1.5 28

27 Stipules cordiform or broadly ovate, auriculate at the base; lower surface of leaves glabrous, occasionally sparsely pubescent; secondary leaf veins 3–5 pairs, 30–45° to the midrib ..... 9. **P. cornmanae**

– Stipules obovate, oblong or narrowly ovate, neither cordiform nor auriculate at the base; lower surface of leaves always pubescent; secondary leaf veins 6–17 pairs, 45–90° to the midrib ..... 6. **P. centradenoides**

28 Lower surface of leaves glabrous ..... 4. **P. auriculata**

– Lower surface of leaves pubescent 29

29 Leaves orbicular or suborbicular ..... 33. **P. nummulariifolia**

– Leaves ovate, elliptic, obovate, rhomboid or lanceolate 30

30 Leaves obovate, rarely elliptic or ovate 31

– Leaves lanceolate, ovate, elliptic or rhomboid, occasionally obovate, in which case elliptic and/or ovate leaves also present 32

31 Plants to 10 cm; stem obscured by rosette of leaves ..... 47. **P. rostulata**

– Plants to 30 cm; stem clearly visible ..... 25. **P. involucrata**

32 Stipules as broad or broader than long, broadly ovate or cordiform 33

– Stipules longer than broad, oblong, obovate or narrowly ovate 34

33 Leaf margin deeply serrate; inflorescences unisexual; staminate flowers 3-parted, borne in solitary compact heads, the bracts forming an involucre ..... 48. **P. rugosissima**

– Leaf margin crenate-serrate, not deeply so; inflorescences bisexual; staminate flowers 4-parted, borne in loose panicles, the bracts not forming an involucre ..... .42. **P. pubescens**

34 Secondary veins < 8 pairs on larger leaves; fruit 1–3 mm long 35

– Secondary veins > 8 pairs on larger leaves; fruit < 2 mm long 37

35 Leaf margin entire from the base for 1/10–1/8 of its length; fruit 1.0–1.4 mm long ..... 1. **P. corona**

– Leaf margin entire from the base for 1/4–1/2 of its length; fruit 2–3 mm long 36

36 Lateral veins visible for over 3/4 of the leaf length; upper surface of leaves sparsely pubescent, the hairs < 1 mm long; staminate flowers 3-parted ..... 54. **P. tripartita**

– Lateral veins visible for 1/2–2/3 of the leaf length; upper surface of leaves pubescent, the hairs > 1 mm long; staminate flowers 4-parted ..... 42. **P. pubescens**

37 Staminate flowers borne in 1 or more compact heads 38

– Staminate flowers borne in loose panicles, occasionally borne in clumps along panicle branches 40

38 Cystoliths of upper leaf surface fusiform; leaf base cordate or subcordate; leaf apex acuminate to acute; subapical appendage of staminate tepals glabrous ..... 37. **P. pittieri**

– Cystoliths of upper leaf surface fusiform, 'V'- and or 'Y'-shaped; leaf base never cordate; leaf apex obtuse or cuspidate; subapical appendage of staminate tepals pubescent 39

39 Epiphytic or epipetric; leaves lanceolate, narrowly elliptic, occasionally elliptic; pistillate inflorescences 3–10 mm long, the peduncle 1/3–1/2 inflorescence length ..... 11. **P. corona**

– Terrestrial; leaves broadly elliptic, obovate or rhomboid; pistillate inflorescence 12–24 mm long, the peduncle 1/2–2/3 inflorescencelength ..... 15. **P. digitata**

40 Stems pubescent, with hairs to 1.8 mm long; cystoliths on stem fusiform, 'V'- and or 'Y'-shaped; leaves oblanceolate, rhomboid or broadly elliptic; fruit > 1.0 mm long ..... 18. **P. fasciata**

– Stems pubescent, with hairs to 0.8 mm long; cystoliths on stem fusiform; leaves ovate to ovate-lanceolate; fruit 0.5–1.0 mm long 41

41 Cystoliths on upper surface of leaves fusiform; apices of leaves acuminate to subcaudate; stipules 7–20 mm long; staminate inflorescences 30–90 mm long; fruit 1.0 mm long ..... 1. **P. acuminata**

– Cystoliths on upper surface of leaves fusiform, 'V'- and or 'Y'-shaped; apices of leaves acute or subcuspidate; stipules 6–7 mm long; staminate inflorescences 12–18 mm long; fruit 0.7–0.8 mm long ..... 21. **P. gomeziana**

42 Upper surface of leaves pubescent 43

– Upper surface of leaves glabrous 45

43 Margin serrate; staminate flowers 2-parted ..... 23. **P. hyalina**

– Margin entire; staminate flowers 4-parted 44

44 Leaves > 13 mm long, evenly spaced along the stem, occasionally clustered but never forming terminal rosettes, the lower surfaces pubescent towards the base ..... **36. P. parietaria**

– Leaves < 10 mm long, clustered towards the apex forming terminal rosettes, the lower surfaces glabrous ..... 22. **P. herniarioides**

45 Leaves of equal or subequal length in pair, where subequal the ratio of smaller to larger < 1:1.5 ..... .46

– Leaves of unequal length in pair, the ratio of smaller to larger ≥ 1:1.5 56

46 Leaves pinnately-veined 47

– Leaves 3-veined 49

47 Leaf margin entire ..... 32. **P. microphylla**

– Leaf margin crenate or crenate-serrate 48

48 Leaves linear-lanceolate; staminate inflorescences borne at the base of an internode which is shorter than the adjacent leaves ..... 39. **P. plumulosa**

– Leaves oblanceolate, narrowly rhomboid or narrowly obovate; staminate inflorescences borne at the base of an internode which is longer than, or rarely equal to, the adjacent leaves ..... 38. **P. pleuroneura**

49 Lateral primary veins visible for less than 3/4 the leaf length 50

– Lateral primary veins visible for 3/4 or more of the leaf length 51

50 Pistillate inflorescences bearing 6–20 flowers; larger petiole in pair < 14 mm long ..... 14. **P. dauciodora**

– Pistillate inflorescences bearing 30–300 flowers; larger petiole in pair ≥ 14 mm long ..... 56. **P. vulcanica**

51 The majority of petioles equal or subequal at each node, where subequal the ratio of shorter to longer < 1.5 52

– The majority of petioles unequal at each node, the ratio of the shorter to longer > 1.5 54

52 Leaves 2.5–7 mm wide; petioles < 4 mm long; staminate inflorescences bearing < 24 flowers ..... .27. **P. killipiana**

– Leaves > 8 mm wide; petioles > 4 mm long; staminate inflorescences bearing > 24 flowers 53

53 Secondary leaf veins straight or weakly curved, 60–90° to the midrib; staminate inflorescences 8–25 mm long; staminate pedicels up to 1 mm long ..... 31. **P. mexicana**

– Secondary leaf veins strongly curved, 45–60° to the midrib; staminate inflorescences 15–75 mm long; staminate pedicels up to 3 mm long ..... 20. **P. glabra**

54 Leaves ovate, frequently falcate; staminate flowers 1.3–1.5 mm long ..... 17. **P. falcata**

– Leaves oblong, linear-lanceolate, lanceolate or oblong-lanceolate, rarely falcate; staminate flowers 1.5–2.8 mm long 55

55 Stems drying yellow-green, pale green or green; staminate peduncle 8/10–9/10 inflorescence– length, the flowers borne in solitary compact heads ..... .3. **P. angustifolia**

– Stems drying brown, dark brown or black; staminate peduncle 1/8–1/3 inflorescence-length, the flowers borne in loose panicles .... 20. **P. glabra**

56 Larger leaf in pair pinnately veined 57

– Larger leaf in pair 3-veined 59

57 Leaves entire; staminate flowers 0.5–0.8 mm long .... 32. **P. microphylla**

– Leaves apically 3–5-dentate, rarely entire; staminate flowers 1.0–1.8 mm long 58

58 Smaller leaf in pair not reflexed; larger leaf in pair 10–63 mm long; staminate flowers 1–1.5 mm long ..... 24. **P. imparifolia**

– Smaller leaf in pair generally reflexed, appearing proximate to larger leaf; larger leaf in pair 5–11.5 mm long; staminate flowers 1.5–1.8 mm long ..... 53. **P. tridentata**

59 Stems prostrate 60

– Stems erect 67

60 Fruit ≥ 1.8 mm. 61

– Fruit ≤ 1.5 mm 63

61 Larger leaf in pair ≤ 30 mm. ..... 55. **P. tutensis**

– Larger leaf in pair > 35 mm. 62

62 Stems angulate in cross-section, drying dark brown almost black; staminate inflorescences solitary, bearing 11–50 flowers; pistillate inflorescences bearing 4–30 flowers ..... 30. **P. magnicarpa**

– Stems rounded or irregularly shaped in cross-section, not angulate, drying red-brown to dark brown; staminate inflorescences 1–4 per axil, bearing 15–200 flowers; pistillate inflorescences bearing 5–95(450) flowers ..... 43. **P. purulensis**

63 Lateral veins of leaves visible for 2/3 or less of the leaf length 64

– Lateral veins of leaves visible for 3/4 or more of the leaf length 65

64 Smaller leaf in pair < 4 mm wide; major petiole in pair 1.0–1.5 mm long ..... 44. **P. quadrata**

– Smaller leaf in pair ≥ 4 mm wide; major petiole in pair 1.5–2.5 mm long ..... 24. **P. imparifolia**

65 Lower surface of leaves pubescent, the hairs *c.* 0.5 mm long .... 13. **P. daguensis**

– Lower surface of leaves glabrous 66

66 Stems with 'V'- or 'Y'-shaped cystoliths; minor leaves in pair 3–8 mm wide; pistillate inflorescences bearing 12–200 flowers .... 35. **P. pansamalana**

– Stems lacking 'V'- or 'Y'-shaped cystoliths; minor leaves in pair 1.5–2.5 mm wide; pistillate inflorescences bearing 6–25 flowers .... 16. **P. ecboliophylla**

67 Fruit > 1.5 mm. ..... .68

– Fruit ≤ 1.5 mm. 70

68 Smaller petioles in pair ≥ 3 mm long. ..... 8. **P. conjugalis**

– Smaller petioles in pair ≤ 1.5 mm long, or leaves sessile 69

69 Stems angulate in cross-section, drying dark brown almost black; staminate inflorescences solitary, bearing 11–50 flowers; pistillate inflorescences bearing 4–30 flowers ..... 30. **P. magnicarpa**

– Stems rounded or irregularly shaped in cross-section, not angulate, drying red-brown to dark brown; staminate inflorescences 1–4 per axil, bearing 15–200 flowers; pistillate inflorescences bearing 5–95(450) flowers ..... 43. **P. purulensis**

70 Smaller leaf in pair ≥ 10 mm wide. ..... 50. **P. skutchii**

– Smaller in pair < 9 mm wide 71

71 Upper surface of leaves lacking 'V'- or 'Y'-shaped cystoliths; secondary leaf veins inserted 45– 60° to the midrib; Costa Rica and Panama ..... 12. **P. costaricensis**

– Upper surface of leaves with some 'V'- or 'Y'-shaped cystoliths present; secondary leaf veins inserted 60–90° to the midrib; Tabasco, Chiapas, Guatemala and Belize 72

72 Smaller leaf in pair 1.0–1.8 mm wide; staminate inflorescences 16–54 mm, the flowers borne in a compact head ..... 46. **P. riparia**

– Smaller leaf in pair ≥ 3 mm wide; staminate inflorescences < 15 mm, the flowers borne in a loose panicle 73

73 Larger leaf in pair with 1/3 margin entire from the base; staminate inflorescences 10–14 mm; staminate tepal subapical appendage *c.* 0.1 mm, scale-shaped ..... 35. **P. pansamalana**

– Larger leaf in pair with 2/3 margin entire from the base; staminate inflorescences 4–9 mm; staminate tepal subapical appendage 0.5–1 mm, corniculate ..... 7. **P. chiapensis**

1. **Pilea acuminata** Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 302 (1851). Type: Mexico, *Liebmann* 14238 '2' (C!-holotype).

Pilea longipes Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 302 (1851). Type: Mexico, *Liebmann* 14242 (C!-holotype).

DISTRIBUTION. Mexico (Guerrero, Oaxaca, Veracruz and Chiapas), Costa Rica, Panama, 400–1700 m; South America.

2. **Pilea adamsiana** A.K. Monro in *Bull. nat. Hist. Mus. Lond. (Bot.)* **30**: 9 (2000). Type: Panama, *Hammel* 4702 (MO!-holotype).

DISTRIBUTION. Panama (Veraguas), 1300–1500 m.

3. **Pilea angustifolia** Killip in *J. Wash. Acad. Sci.* **15**: 295 (1925). Type: Costa Rica, *Cook & Doyle* 181 (US!-holotype).

DISTRIBUTION. Costa Rica (Alajuela, Cartago, Puntarenas and San José), 1100–2300 m.

4. **Pilea auriculata** Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 299 (1851). Type: Costa Rica, *Oersted* s.n. (C!-holotype).

DISTRIBUTION. Mexico (Chiapas), Guatemala, Costa Rica and Panama, 1400–3000 m.

5. **Pilea cadierei** Gagnep. & Guillaumin in *Bull. Mus. Hist. Nat.* sér. 2, **10**: 629 (1938). Type: Cultivated, from material collected in Vietnam by Cadière, *Anon.* s.n. (P!-holotype).

DISTRIBUTION. Mexico (Chiapas), Honduras, El Salvador and Costa Rica, 600–1400 m; West Indies, South America, Asia, Africa, Pacific Islands.

In cultivation throughout the tropics as an ornamental and frequently escaping.

The holotype consists of a packet containing two leaves and an inflorescence, accompanied by an original line drawing by F. Gagnepain.

6. **Pilea centradenoides** Seem., *Bot. voy. Herald* **4**: 194 (1854). Type: Panama, *Seemann* 1099 (BM!-holotype; F!, MO!-isotypes); Panama, San Blas, trail from Puerto Obaldía to La Bonga, tributary of the Río Armila, *c.* 2 hours walk from Puerto Obaldía, 8°40'N 77°25'W, 0–50 m, 17 April 1982, *Knapp & Mallet* 4672 (BM!-epitype, designated here; MO!-isoepitype).

Pilea trianaeana Wedd. in A.DC., *Prodr.* **16**(1): 121 (1869). Type: Colombia, *Triana* 887 (P!-lectotype, designated here; NY!-isolectotypes).

P. variegata Wedd. in A.DC., *Prodr.* **16**(1): 123 (1869), non Seemann (1854).

P. seemannii Killip in *Contr. U.S. Natl. Herb.* **26**: 382 (1936). Type: Colombia, *Triana* 888 (P!-holotype; BM!-isotype).

DISTRIBUTION. Panama, 0–1500 m; South America.

An epitype was selected for *Pilea centradenoides* because the specimen cited by Seemann as type is a sterile collection and therefore potentially ambiguous.

A specimen of *Triana* 887 at BM has had the collection number crudely altered from 885 to 887 in darker ink. This collection is therefore not recognized as an isotype of *Pilea trianaeana* Wedd. in this treatment.

The collection cited by Killip (1936) as the type of *Pilea seemanii* is numbered '888' at P and BM. However, there is some evidence (Killip, 1936; pers. obs.) that duplicate Triana collections distributed to other herbaria were either not numbered, or numbered differently. For example, Killip observed that the locality information is cited differently for the duplicate collections of *Triana* 888 and in the case of other Triana collections, collection numbers have been altered.

The combination *Pilea variegata* (Spreng.) Seem. was generated to account for one of Seemann's collections from Panama. The incorporation of *Urtica variegata* Spreng. into the genus *Pilea* by Seemann is generally accepted; however, the Seemann collection (*Seemann* 561, BM) does not correspond to the taxon described by Sprengel as *U. variegata* but to another species, *P. centradenoides*.

7. **Pilea chiapensis** Killip in *J. Wash. Acad. Sci.* **15**: 295 (1925). Type: Mexico, *Rovirosa* 938 (PH!-holotype).

Pilea caudata Killip in *J. Wash. Acad. Sci.* **15**: 295 (1925), non Winkler (1922). Type: Guatemala, *Cook & Griggs* 609 (US!-holotype).

DISTRIBUTION. Mexico (Tabasco and Chiapas), Belize and Guatemala, 600–1200 m.

8. **Pilea conjugalis** A.K. Monro in *Bull. nat. Hist. Mus. Lond. (Bot.)* **30**: 7 (2000). Type: Panama, *Pittier* 3230 (NY!-holotype).

DISTRIBUTION. Costa Rica and Panama, 1400–2200 m.

9. **Pilea cornmanae** Killip in *J. Wash. Acad. Sci.* **15**: 292 (1925). Type: Panama, *Killip* 3543 (US!-holotype).

DISTRIBUTION. Costa Rica and Panama, 1500–2000 m.

10. **Pilea cornuto-cucullata** Cufod. in *Arch. Bot. Sist.* **10**: 29 (1934). Type: Costa Rica, *Cufodontis* 292 (W†-holotype; F!-photograph ex W); Costa Rica, San José, along the trail from Canaán to Chirripó via Los Angeles, above (north of) the Río Talari, 9°30'N 83°32'W, 3100–3200 m, 24 August 1971, *Burger* 8326 (F!-neotype, designated here).

DISTRIBUTION. Costa Rica and Panama, 2900–3200 m.

The holotype has been destroyed and only a photograph of the type specimen could be traced. Since no duplicates of the holotype have been located, a neotype has been selected.

11. **Pilea corona** A.K. Monro in *Bull. nat. Hist. Mus. Lond. (Bot.)* **31**: 5 (2001). Type: Panama, *Antonio* 2043 (PMA!-holotype; MO!-isotype).

DISTRIBUTION. Panama (Chiriquí, Veraguas), 700–1200 m.

12. **Pilea costaricensis** Donn. Sm. in *Bot. Gaz.* **20**: 294 (1895). Type: Costa Rica, *Cooper* 5952 (US-799606!-holotype; US-799605!, K!-isotypes).

DISTRIBUTION. Costa Rica and Panama, 1000–1900 m.

13. **Pilea daguensis** Killip in *Contr. U.S. Natl. Herb.* **26**: 382 (1936). Type: Colombia, *Triana* 889 (P!-holotype; BM!-isotype).

Pilea dendrophila var. *major* Wedd. in A.DC. *Prodr.* **16**(1): 122 (1869). Type: Colombia, *Triana* 889 (P!-holotype).

DISTRIBUTION. Mexico (Chiapas), Panama, 100–1000 m; South America.

14. **Pilea dauciodora** Wedd. ex Pav. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 223 (1852). Type: Peru, *Pavón* s.n. (FI-W-holotype; BM!-photograph).

Pilea uncidens Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 224 (1852). Type: Bolivia, *Weddell* 4561 (P!-holotype).

P. dauciodora var. *uncidens* (Wedd.) Wedd. in A.DC., *Prodr.* **16**(1): 121 (1869).

DISTRIBUTION. Mexico (Chiapas), Guatemala, Honduras, El Salvador, Costa Rica, 1400–3300 m; South America.

15. **Pilea digitata** A.K. Monro in *Bull. nat. Hist. Mus. Lond. (Bot.)* **31**: 7 (2001). Type: Panama, *Hampshire & Whitefoord* 189 (PMA!-holotype; BM!, MO!-isotypes).

DISTRIBUTION. Panama (Bocas del Toro, Chiriquí, Coclé, and Darien), 700–1700 m.

16. **Pilea ecboliophylla** Donn. Sm. in *Bot. Gaz.* **46**: 115 (1908). Type: Guatemala, *von Tuerckheim* 7983 (US!-holotype; GH!, MO!, NY!-isotypes).

Pilea diversissima Killip in *Fieldiana, Bot.* **18**: 394 (1937). Type: Costa Rica, *Brenes* 4851 (F!-holotype; GH!, NY!-isotypes).

DISTRIBUTION. Mexico (Tabasco, Chiapas), Guatemala, Honduras, Nicaragua, Costa Rica and Panama, 0–1500 m; South America.

Pilea ecboliophylla closely resembles *P. rhizobola* Miq. from Brazil, and further study may place these names in synonymy, in which case *P. rhizobola* would have priority.

17. **Pilea falcata** Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.*, ser. 5, **2**: 304 (1851). Type: Mexico, *Liebmann* 14241 (C!-holotype; F!-isotype).

DISTRIBUTION. Although not known from Mesoamerica, the type collection is from the neighbouring state of Oaxaca and this species is expected to occur in Chiapas. Breedlove (1986: 191) recorded *Pilea falcata* for Chiapas, but the determinations of the collections on which this record is based are erroneous.

18. **Pilea fasciata** Wedd. in A.DC., *Prodr.* **16**(1): 149 (1869). Type: Colombia, *Triana* s.n. (P!-holotype; BM!-isotype).

DISTRIBUTION. Costa Rica, Panama, 0–1300 m; South America.

19. **Pilea forgeti** N.E. Br. in *Bot. Mag.* **13**: t. 8699 (1917). Type: material grown from seed collected by Forget in Venezuela, *Brown* s.n. 'June 4, 1914' (K!-lectotype, designated here).

DISTRIBUTION. Panama, 0–900 m, South America.

Collections of *Pilea forgeti* are often incorrectly determined as *P. fasciata* Wedd.

The lectotype, although not cited in the original protologue, was determined and annotated by Brown: '*Type specimen!*'.

20. **Pilea glabra** S. Watson in *Proc. Amer. Acad. Arts* **26**: 152 (1891). Type: Mexico, *Pringle* 3550 (GH!-holotype; K!-isotype).

Pilea tuerckheimii Donn. Sm. in *Bot. Gaz.* **46**: 116 (1908). Type: Guatemala, *von Tuerckheim* 1835 (US!-holotype; NY!-isotype).

DISTRIBUTION. Mexico (San Luis Potosi, Veracruz and Chiapas), Belize, Guatemala, Honduras, Nicaragua and Costa Rica, 200–1900 m.

21. **Pilea gomeziana** W.C. Burger in *Phytologia* **31**: 269 (1975). Type: Costa Rica, *Gómez P.* 3304 (F!-holotype; CR, MO!, NY!, US-isotypes).

DISTRIBUTION. Costa Rica (Cocos Island), altitude unknown.

22. **Pilea herniarioides** (Sw.) Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 207 (1852). *Urtica herniarioides* Sw. in *Kongl. Vetensk. Acad. Nya Handl.* **8**: 64 (1787). Type: Hispaniola, *Swartz* s.n. (S-holotype; BM!-isotype).

Pilea deltoidea Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 302 (1851). Type: Costa Rica, *Oersted* 14240 '11/46' (C!-holotype).

P. microphylla var. *peregrina* Griseb., *Pl. wright.*: 173 (1860). Type: Cuba, 1860–1864, *Wright* 1458 (B†-holotype; BM!-lectotype, designated here; K!, MO!, P!-isolectotypes).

P. brittoniae Urb., *Symb. antill.* **5**: 528 (1908). Type: Jamaica, vicinity of Cinchona, Point Heberu's Gap to Marc's Gap, 2–10 September 1906, *Britton* 95 (B†-holotype; BM!-lectotype, designated here; K!, MO!, NY!-isolectotypes).

P. herniarioides var. *peregrina* (Griseb.) Urb. in *Ark. Bot.* **23A**(5): 48 (1930).

P. peregrina (Griseb.) Grudz. & P. Herrera in *Novosti Sist. Vyssh. Nizsh. Rast.* **23**: 52 (1986).

DISTRIBUTION. El Salvador, Costa Rica and Panama, 600–1000 m; West Indies.

Commonly grown as an ornamental in gardens and probably present throughout Central America.

Pilea peregrina was apparently spelled incorrectly as 'perexigua' when the combination was published by Grudzinskaja & Herrera (1986). This would appear to be based on Urban's (1930) re-spelling of the epiphet in his recombination of Grisebach's variety as *P. microphylla* var. *perexigua* (Griseb.) Urb. A reason for changing Grisebach's epiphet is not given in either publication and the original name is used here.

23. **Pilea hyalina** Fenzl in *Denkschr. Kaiserl. Akad. Wiss., Math. - Naturwiss. Kl.* **1**: 256 (1850). Type: Peru, *Poeppig* s.n. 'Peruvia subandina prope Cuchero ad fossas cultorum, Dec. 1829' (C!-lectotype, designated here).

Pilea lundii Liebm. in *Kongel. Danske Vidensk.Selsk. Skr., Naturvidensk. Math. Afd.*, ser. 5, **2**: 299 (1851). Type: Brazil, *Lund* s.n. (C!-lectotype, designated here).

P. scrobiculata Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.*, ser. 5, **2**: 300 (1851). Type: Mexico, *Liebmann* s.n. '14254' (C!-holotype).

DISTRIBUTION. Mexico (Chiapas), Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica and Panama, 0–1600 m; South America.

24. **Pilea imparifolia** Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 212 (1852). Type: French Guiana, 1845, *Mélinon* 123 (P!-lectotype, designated here).

Pilea dendrophila Miq. in Mart., *Fl. Brasil.* **12**: 202 (1853). Type: Brazil 'Solimoês fluvium, Rio Negro', *Martius* s.n. (M!-holotype).

DISTRIBUTION. Costa Rica and Panama, 100–1600 m; South America.

25. **Pilea involucrata** (Sims) Urb., *Symb. antill.* **1**: 298 (1899). *Urtica involucrata* Sims in *Bot. Mag.* **51**: t. 2481 (1824). Holotype: Sims, *Bot. Mag.* 51: t. 2481 (1824); St. Vincent, *Anderson* s.n. 'purchased 1853' (K!-epitype, designated here).

Pilea chrysosplenoides Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 209 (1852). Type: Colombia 'près Fusaguasuga, 1844', *Goudot* s.n. (P!-holotype).

P. ovalis Griseb., *Fl. Brit. W. I.*: 159 (1859). Type: Trinidad, *Gaspari* s.n. (K!-lectotype, designated here).

DISTRIBUTION. Costa Rica and Panama, 100–1300 m; West Indies, South America.

Sims provided only an illustration as a type element and no other type elements were traced at K. Because of the ambiguous nature of the illustration it is felt that the designation of an epitype is appropriate.

26. **Pilea irrorata** Donn. Sm. in *Bot. Gaz.* **19**: 11 (1894). Type: Guatemala, *Smith* 2751 (US!-holotype).

DISTRIBUTION. Mexico (Oaxaca, Veracruz, Chiapas) and Guatemala, 0–2000 m.

27. **Pilea killipiana** Standl. & Steyerm. in *Fieldiana, Bot.* **24**: 415 (1952). Type: Guatemala, *Steyermark* 44700 (F!-holotype; NY!, US!-isotypes).

DISTRIBUTION. Mexico (Chiapas), Guatemala, 300–500 m.

28. **Pilea latifolia** Wedd. in *Arch. Mus. Hist. Nat.* **9**: 249 (1856). Type: Colombia, Ocana, 3000 ft, '3000 Ps' [annotation by Schlim], June 1846–1852, *Schlim* 701 (P!-lectotype, designated here).

DISTRIBUTION. Panama (Darien, Panamá), 400–1700 m; South America.

Label information for the type collection indicates that this is a mixed collection. Each sheet has a different altitude indicated and therefore should be considered as a distinct collection, although all sheets have the same collection number and handwriting.

29. **Pilea lindeniana** Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 210 (1852). Type: Colombia, *Linden* 799 (P!-holotype; BM!, K!-isotypes).

DISTRIBUTION. Panama (province unknown), 2000–2800 m; South America.

30. **Pilea magnicarpa** A.K. Monro in *Novon* **9**: 398 (1999). Type: Panama, *Hammel* 2424 (MO!-holotype; NY!-isotype).

DISTRIBUTION. Panama (Coclé, San Blas), 400–1400 m.

31. **Pilea mexicana** Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 214 (1852). Type: Mexico, *Linden* 651 (P!-holotype).

Pilea quichensis Donn. Sm. in *Bot. Gaz.* **19**: 12 (1894). Type: Guatemala, *Heyde & Lux* 3147 (US-holotype; K!-isotype).

DISTRIBUTION. Mexico (Veracruz, Chiapas) and Guatemala, 1200–2100 m.

32. **Pilea microphylla** (L.) Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 296 (1851). *Parietaria microphylla* L., *Syst. nat.* 10th ed.: 1308 (1759). Type: Jamaica?, LINN-1220.8 (LINN!-lectotype, designated by De Rooij, 1975).

Urtica serpyllacea Kunth in Humb., Bonpl. & Kunth, *Nov. gen. sp.* **2**: 37 (1817). Type: Equatorial America, *Bonpland* 2143 (P!-holotype).
Pilea muscosa Lindl., *Coll. bot.*: t. **4** (1821), nom. superfl.
P. serpyllacea (Kunth) Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 296 (1851).
P. portula Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 297 (1851). Type: Costa Rica, 'Aguacate', *Oersted* s.n (C!-holotype).

DISTRIBUTION. Mexico (Tabasco, Chiapas, Yucatán, Campeche, Quintana Roo), Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica , Panama, 0–2400 m; North America, Greater Antilles, Leeward Islands, Windward Islands, South America.

This species is cultivated worldwide as an ornamental.

The lectotype of *Pilea microphylla* is a Patrick Browne specimen, almost certainly collected in Jamaica, and probably purchased by Linnaeus in 1758 (Savage, 1945). In addition Linnaeus refers to Sloane's *Voy. Jamaica* (1707) in his original description.

33. **Pilea nummulariifolia** (Sw.) Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 225 (1852). *Urtica nummulariifolia* Sw. in *Kongl. Vetensk. Acad. Nya Handl.* **8**: 63 (1787). Holotype: *Kongl. Vetensk. Acad. Nya Handl.* **8**: t.1, f. 2 (1787); Jamaica, *Swartz* s.n. 'Herb. Alströmer' (S!-epitype, designated here).

DISTRIBUTION. Guatemala, Honduras, El Salvador, Costa Rica and Panama, 0–1500 m; Greater Antilles, South America.

This species is frequently used as an ornamental in gardens.

The type for *Pilea nummulariifolia* is an illustration which was felt to be ambiguous in view of the large number of neotropical *Pilea* species, and an epitype is selected from amongst Swartz's Jamaican collections.

34. **Pilea pallida** Killip in *J. Wash. Acad. Sci.* **15**: 295 (1925). Type: Panama, *Rowlee & Rowlee* 376 (US!-holotype).

DISTRIBUTION. Costa Rica and Panama, 0–1200 m.

35. **Pilea pansamalana** Donn. Sm. in *Bot. Gaz.* **19**: 10 (1894). Type: Guatemala, *von Tuerckheim* 939 (US-holotype; B†, GH!, NY!, P!-isotypes).

DISTRIBUTION. Mexico (Chiapas) and Guatemala, 800–2600 m.

36. **Pilea parietaria** (L.) Blume, *Mus. bot.* **2**: 48 (1856). *Urtica parietaria* L., *Sp. pl.*: 985 (1753). Lectotype: Sloane, *Voy. Jamaica* **1**: t. 93, f. 1 (1707), designated by Kellogg, 1988.

Urtica ciliaris L., *Syst. nat.* 10th ed.: 1266 (1759). Lectotype: Plumier, *Pl. amer.*: t. 120, f. 2 (1757), designated by Kellogg, 1988.
U. rhombea L.f., *Suppl. pl.*: 417 (1782). Type: Mexico, LINN-1111.25 (LINN!-holotype).
Pilea integrifolia Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 298 (1851). Type: Mexico, *Liebmann* 14339 '2' (C!-holotype).
P. rhombea (L.f.) Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 305 (1851).
P. ciliaris (L.) Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 209 (1852).
P. rubiifolia Blume, *Mus. bot.* **2**: 49 (1856). Type: Guatemala, Alta Verapaz Department, Rubeleruz, 3000 ft, May 1887, *von Tuerckheim* 1270 (F!-neotype, designated here; P!- isoneotype).

DISTRIBUTION. Mexico (Chiapas, Yucatán), Guatemala, Honduras, Nicaragua, Costa Rica and Panama, 300–2000 m; Greater Antilles, Leeward Islands.

A neotype is selected for *Pilea rubiifolia* because Blume did not explicitly cite any type material in his protologue. His citation '– *Yantencillo* incolar.– In Guatemalâ ad rivos.', implies that he saw a collection. However, no type material could be located at BM, L or P and it was therefore decided to select a neotype. Standley & Steyermark (1952: 418) erroneously cited *von Tuerckheim 1270* as the type collection.

The lectotype of *Pilea parietaria* (L.) Blume is an illustration based on a typotype collection made by Sloane in Jamaica: Herb. Sloane Vol. 2: 120, BM-SL!

37. **Pilea pittieri** Killip in *J. Wash. Acad. Sci.* **15**: 298 (1925). Type: Costa Rica, *Pittier* 14149 (US-1080422!-holotype; US-577992!-isotype).

Pilea phenacoides Killip in *Fieldiana, Bot.* **18**: 1548 (1938). Type: Costa Rica, *Smith* A443 (US!-holotype; F!-isotype).

DISTRIBUTION. Costa Rica (Alajuela, Cartago, Heredia, Limón, Puntarenas, San José), 600–2300 m.

38. **Pilea pleuroneura** Donn. Sm. in *Bot. Gaz.* **19**: 12 (1894). Type: Guatemala, *von Tuerckheim* 754 (US-holotype; GH!, NY!, P!-isotypes).

DISTRIBUTION. Mexico (Chiapas) and Guatemala, (300–)1200–4000 m.

39. **Pilea plumulosa** A.K. Monro in *Novon* **9**: 392 (1999). Type: Panama, *Kirkbride & Duke* 944 (NY!-holotype; MO-2090983!, MO-2605434!-isotypes).

DISTRIBUTION. Panama (Bocas del Toro-Chiriquí border), 2500 m.

40. **Pilea pteridophylla** A.K. Monro in *Novon* **9**: 390 (1999). Type: Mexico, *Hanan A.* 438 (MEXU!-holotype).

DISTRIBUTION. Mexico (Tabasco), 600 m.

A number of collections from Veracruz (*Wendt* et al. 4877 & 3912) and Oaxaca (*Wendt* et al. 2538) closely resemble *Pilea pteridophylla*, but differ in the presence of equal-sized leaves at each node. Further study is needed to decide whether these collections represent a new taxon.

41. **Pilea pteropodon** Wedd. in A.DC., *Prodr.* **16**(1): 144 (1869). Type: Colombia, *Triana* s.n. (P!-holotype; BM!-isotype).

Pilea ptericlada Donn. Sm. in *Bot. Gaz.* **31**: 121 (1901). Type: Costa Rica, Cartago, Atirro, 600 m, April 1896, *Smith* 6779 (US!-lectotype, designated here).

DISTRIBUTION. Costa Rica and Panama, 0–2000 m; South America.

This species closely resembles *Pilea verbascifolia* (Poir.) Wedd., endemic to the Mauritius Islands.

42. **Pilea pubescens** Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 303 (1851). Type: Brazil, *Lund* s.n. '1' (C!-lectotype, designated here).

Pilea fuscata Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 300 (1851). Type: Mexico, *Liebmann* s.n. (C-holotype; GH!, P!-isotypes).

P. rupicola Wedd. in *Ann. Sci. Nat., Bot.* sér. 3, **18**: 224 (1852). Type: Mexico, Tabasco, Teapa, December, *Linden* 71 (FI-W-lectotype, designated here; BM!-photograph).

DISTRIBUTION. Mexico (Tabasco, Chiapas), Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica and Panama, 0–3000 m; South America.

This species is frequently grown as a garden ornamental throughout the neotropics.

In his original description of *Pilea rupicola,* Weddell cites a collection by Linden which he saw at P. This collection could not be traced on a visit there in 1999.

43. **Pilea purulensis** Donn. Sm. in *Bot. Gaz.* **46**: 115 (1908). Type: Guatemala, *von Tuerckheim* 1707 (US-holotype; BM!, C!, F!, GH!, NY!-isotypes).

Pilea chiriquina Killip in *J. Wash. Acad. Sci.* **15**: 291 (1925). Type: Panama, *Killip* 3546 (US!-holotype).

P. donnell-smithiana Killip in *J. Wash. Acad. Sci.* **15**: 292 (1925). Type: Costa Rica, *Donnell Smith* 7467 (US!-holotype; GH!-isotype).

DISTRIBUTION. Costa Rica and Panama, 1000–2100 m; South America.

44. **Pilea quadrata** A.K. Monro in *Novon* **9**: 395 (1999). Type: Panama, *Antonio* 1345 (MO!-holotype).

DISTRIBUTION. Panama (Panama, Colón), 200–500 m.

45. **Pilea quercifolia** Killip in *Phytologia* **1**: 146 (1935). Type: Guatemala, *Skutch* 559 (US!-holotype; GH!-isotype).

DISTRIBUTION. Mexico (Chiapas) and Guatemala, 1300–2400 m.

46. **Pilea riparia** Donn. Sm. in *Bot. Gaz.* **19**: 11 (1894). Type: Guatemala, *von Tuerckheim* 1040 (F-holotype; GH!, NY!, P!-isotypes).

DISTRIBUTION. Guatemala (Alta Verapaz, Baja Verapaz), *c.* 1000 m.

47. **Pilea rostulata** A.K. Monro in *Novon* **9**: 395 (1999). Type: Panama, *Antonio* 1237 (BM!-holotype; MO!-isotype).

DISTRIBUTION. Panama (Colón), 0–400 m.

48. **Pilea rugosissima** Killip in *Proc. Biol. Soc. Wash.* **52**: 28 (1939). Type: Panama, *Davidson* 335 (F!-holotype; GH!–isotype).

DISTRIBUTION. Panama (Chiriquí, Bocas del Toro), 1800–2500 m.

A collection from Chiriquí, *Knapp* 1622 (MO), is unusual in its small stature and epiphytic habit.

49. **Pilea senarifolia** Donn. Sm. in *Bot. Gaz.* **19**: 12 (1894). Type: Guatemala, *Heyde & Lux* 3145 (F-holotype; GH!, MO!, NY!-isotypes).

DISTRIBUTION. Mexico (Chiapas) and Guatemala, *c.* 2400 m.

50. **Pilea skutchii** Killip in *Fieldiana, Bot.* **24**: 421 (1952). Type: Guatemala, *Skutch* 974 (US!-holotype; GH!-isotype).

DISTRIBUTION. Mexico (Chiapas), Guatemala, 1400–2700 m; South America.

51. **Pilea tilarana** W.C. Burger in *Phytologia* **31**: 270 (1975). Type: Costa Rica, *Standley & Valerio* 44753 (US!-holotype).

DISTRIBUTION. Costa Rica (Alajuela), 600–1000 m.

52. **Pilea trichomanophylla** A.K. Monro in *Bull. nat.Hist. Mus. Lond. (Bot.)* **30**: 9 (2000). Type: Panama, *Hammel* et al. 14646 (MO!-holotype).

DISTRIBUTION. Panama (Chiriquí), *c.* 1300 m.

53. **Pilea tridentata** Killip in *J. Wash. Acad. Sci.* **15**: 290 (1925). Type: Guatemala, *von Tuerckheim* 2011 (US-holotype; C!, F!, GH!, MO!, NY!-isotypes).

Pilea mimema Standl. & Steyerm. in *Fieldiana, Bot.* **24**: 417 (1952). Type: Guatemala, *Hatch & Wilson* 162 (F!-holotype).

DISTRIBUTION. Mexico (Oaxaca, Chiapas), Guatemala, (300) 1200–1600 m.

54. **Pilea tripartita** A.K. Monro in *Novon* **9**: 393 (1999). Type: Costa Rica, *Burger & Liesner* 6330 (MO!-holotype; CR!, NY!, US!-isotypes).

DISTRIBUTION. Costa Rica, Panama, 2500–3200 m.

55. **Pilea tutensis** A.K. Monro in *Novon* **9**: 397 (1999). Type: Panama, *Antonio* 1845 (MEXU!-holotype; MO!, NY!-isotypes).

DISTRIBUTION. Panama (Veraguas), 900–1600 m.

56. **Pilea vulcanica** Liebm. in *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* ser. 5, **2**: 303 (1851). Type: Mexico, Veracruz, Riço de Orizaba, Vaqueria del Pacal, 300 m, September 1841, *Liebmann* 14256 '2' (C!-lectotype, designated here).

Pilea standleyi Killip in *J. Wash. Acad. Sci.* **15**: 294 (1925). Type: Costa Rica, *Standley* 38697 (US!-holotype).

P. gracilipes Killip in *J. Wash. Acad. Sci.* **15**: 298 (1925). Type: Costa Rica, *Maxon* 5426 (US-holotype; F!-isotype).

DISTRIBUTION. Mexico (Chiapas), Guatemala, Honduras, El Salvador, Costa Rica and Panama, 1300–3000(4500) m; South America.

The species epithet was incorrectly spelled as '*vulcania*' when first published.

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MATERIAL EXAMINED

Aguilar, R. 26, *irrorata* (F); 323, *hyalina* (F); 500, *dauciodora* (F); 1103, *senarifolia* (F); 1486, *hyalina* (F).
Aguilar, R. & Schmidt, H. 1128, *pteropodon* (MO).
Allen, P.H. 84, *herniarioides* (F); 1737, *acuminata* (F, MO, NY); 4825, *purulensis* (BM, US); 4914, *purulensis* (BM, P, US).
Alston, A.H.G. 8781, *pubescens* (BM); 8786, *centradenoides* (BM); 8791, *imparifolia* (BM, P, US); 8792, *acuminata* (US); 8797, *pallida* (BM).
Amador M., J. et al. 1829, *microphylla* (MEXU).
Anderson, A. s.n 'purchased 1853', *involucrata* (K).
Anderson, R.C. & Mori, S. 282, *glabra* (BM, F).
Anon. '877', *lindeniana* (NY); 11863 'August 1, 1925', *involucrata* (K); s.n., *cadierei* (P).
Antonio, T. 850, *microphylla* (F); 863, *acuminata* (F); 1028, *vulcanica* (BM); 1237, *rostulata* (BM, MO); 1344, *parietaria* (MEXU, MO); 1345, quadrata (MO); 1347, *forgeti* (MO); 1348a, *pteropodon* (MO); 1348b, *pteropodon* (MO); 1522, *pubescens* (NY); 1605, *auriculata* (BM, MO); 1645, *vulcanica* (MO); 1650, *auriculata* (BM, MO); 1845, *tutensis* (MEXU, MO, NY); 2010, *adamsiana* (MO); 2014, *adamsiana* (MO); 2043, *corona* (MO, PMA); 2044, *pteropodon* (BM, MO); 2124, *fasciata* (BM, MO); 2180, *magnicarpa* (MO); 2550, *magnicarpa* (BM, MO); 2610, *purulensis* (BM); 2638, *conjugalis* (MO); 2639, *auriculata* (BM); 2641, *rugosissima* (BM, MO); 2671, *purulensis* (BM, MO); 2767, *magnicarpa* (MO); 2799, *purulensis* (MO); 2833, *digitata* (MO); 2976, *tutensis* (MO); 2984, *corona* (MO); 2986, *pteropodon* (MO); 3035, *magnicarpa* (MO); 3196, *parietaria* (MO); 3441, *pubescens* (MO); 3486, *tutensis* (MO); 3508, *purulensis* (BM, MO); 3537, *corona* (MO); 3994, *pubescens* (MO); 4043, *corona* (MO); 4162, *digitata* (MO); 4163, *digitata* (BM, MO); 4768, *daguensis* (BM, LL); 4769, *daguensis* (MEXU, MO); 4778, *rostulata* (MO); 4779, *rostulata* (MO); 4890, *cornmanae* (MO); 4936, *imparifolia* (BM, MO); 4982, *pubescens* (MO); 5106, *purulensis* (MO).
Antonio, T. & Lent, R. 794, *parietaria* (F).
Apú, B. 130, *auriculata* (MO).
Araquistain, M. 45, *pubescens* (MO); 308, *microphylla* (MO).
Atwood, C. 1279, *microphylla* (NY); 4065, *hyalina* (MO).
Atwood, C. & Neill, D. 102, *pubescens* (MO).
Baker, R. & Burger, W.C. 15, *microphylla* (F); 133, *pteropodon* (F, NY).
Barbey, M.A. 7179, *hyalina* (NY).
Barkley, F.A. & Hernandez M., R. 40192, *microphylla* (GH); 40451, *microphylla* (GH).
Barkley, F.A. & Nickle 40792, *glabra* (GH).
Barkley, F.A. et al. 2522, *pubescens* (F); 2613 (F), *microphylla* (F).
Barringer, K. 3187, *parietaria* (F).
Barringer, K. & Christenson, E. 3379, *conjugalis* (F); 3449, *conjugalis* (LL); 4142, *conjugalis* (LL).
Barringer, K. & Gómez-Laurito, J. 2514, *pittieri* (F).
Barringer, K. & Huft, M. 2778, *auriculata* (LL).
Barringer, K. & Perez G., M. 3762, *imparifolia* (F, LL); 3787, *ecboliophylla* (LL); 3816, *pteropodon* (F, LL); 3839, *ecboliophylla* (LL).
Barringer, K. et al. 3555, *pteropodon* (F); 3948, *pteropodon* (LL); 4106, *ecboliophylla* (LL).

Bartlett, H.H. & Lasser, T. 16801, *microphylla* (MO).
Beaman, J. 4001, *dauciodora* (GH, TEX).
Bechyne & Bohumila 3928, *dauciodora* (ITIC).
Bello, E. 3028, *parietaria* (MO); 3077, *vulcanica* (MO).
Bemudez 42, *microphylla* (ITIC).
Bequaert, J. 24, *irrorata* (F, GH).
Berendsohn, W. & Berendsohn 1145, *dauciodora* (BM, LAGU).
Blackmore, S. & Heath, G.L.A. 1945, *glabra* (BM).
Blum, K.E. & Tyson, E.L. 534 (MO), *involucrata* (MO).
Bonpland, A.J.A. 255, *microphylla* (P); 2143, *microphylla* (P).
Botteri, M. 19, *mexicana* (GH); 283, *hyalina* (P); 284, *pubescens* (BM, P); 285, *pubescens* (P); 286, *hyalina* (BM, P); 539, *acuminata* (BM); 541, aff. *glabra* (BM, P); 1508, *acuminata* (P); 1513, *pubescens* (P); s.n., *pubescens* (P).
Bourgeau, E. 1705, *microphylla* (P); 2463, cf. *pubescens* (P); 3251, *mexicana* (K, P); s.n., *hyalina* (P); s.n., *pubescens* (P); s.n., *pubescens* (P).
Boyle, B. & Boyle, A. 727, *purulensis* (BM).
Breckon, G. & Breckon 2237, *pubescens* (F, MEXU, MO).
Breedlove, D.E. 6182, *microphylla* (F); 6233, *pubescens* (F, LL); 6235, *irrorata* (F); 6962, *microphylla* (F); 6991, *irrorata* (F); 7461, *glabra* (F); 7498, *microphylla* (F); 7828, *dauciodora* (F); 10737, *parietaria* (F); 10738, *irrorata* (F, LL); 11083, *irrorata* (F, LL); 11084, *glabra* (F); 11129, *dauciodora* (F, LL); 11620, *dauciodora* (F, LL); 11999, *pubescens* (F, LL, US); 12000, *pansamalana* (F); 14371, *dauciodora* (MEXU); 14892, *pubescens* (F, LL, MEXU); 15114, *dauciodora* (LL, MEXU); 15305, *dauciodora* (LL, MEXU, NY); 15398, *mexicana* (F, NY); 20264, *pubescens* (LL, MO); 20317, *microphylla* (MO); 25768, *dauciodora* (MEXU, MO); 26055, *pubescens* (MO); 26070, *daguensis* (MO, NY); 26084, *irrorata* (MO); 26259, *dauciodora* (LL, MO); 26364, *microphylla* (MO); 26755, *irrorata* (MEXU); 28146, *pubescens* (LL, MO); 28978, *microphylla* (MO); 29002, *microphylla* (MEXU); 29139, *glabra* (F, LL, MO, NY); 29180, *pubescens* (MEXU, MO, NY); 29472, *dauciodora* (LL, MO); 34594, *mexicana* (MEXU, MO); 34839, *vulcanica* (MEXU, MO); 34875, *chiapensis* (MEXU, MO); 35301, *ecboliophylla* (MEXU); 35384, *killipiana* (MEXU); 36913, *pubescens* (MEXU); 37670, *microphylla* (MEXU); 38186, *pubescens* (MEXU); 40074, *microphylla* (MEXU); 40133, *hyalina* (MO); 40459, *dauciodora* (MEXU, MO).
Breedlove, D.E. & Thorne, R.H. 21209, *pansamalana* (MEXU, TEX).
Brenes, A.M. 14?, *microphylla* (NY); 1906?, *parietaria* (NY); 1937, *hyalina* (NY); 3498, *auriculata* (F); 3500, *auriculata* (NY); 3714, *auriculata* (F, NY); 3764, *angustifolia* (F); 3786, *ecboliophylla* (F); 4001, *angustifolia* (F, NY); 4010, *ecboliophylla* (F, NY); 4527, *tilarana* (F); 4831, *ecboliophylla* (NY); 4851, *ecboliophylla* (F, GH, NY); 6062, *acuminata* (F); 6107, *pteropodon* (F, NY); 6115, *pteropodon* (F, NY); 12662, *glabra* (F); 13198, *ecboliophylla* (F); 13511, *ecboliophylla* (F, NY); 14459, *pubescens* (BM, GH, NY, US); 14651a, *parietaria* (NY); 15663, *pubescens* (F); 15664, *imparifolia* (F, NY); 15664a, *imparifolia* (NY); 15665, *ecboliophylla* (F, NY); 15676, *imparifolia* (F, NY); 16142, *pubescens* (F, NY); 19217, *pubescens* (F, NY); 20520, *tilarana* (F); 22621, *pubescens* (F); 22636, *pubescens* (NY); 23106, *hyalina* (NY).
Brett, J. 342, *pubescens* (TEX); 694, *glabra* (TEX).
Bristan, N. 474, *digitata* (GH); 1043(3), *microphylla* (MO); 1066(2), *pubescens* (MO).
Britton 95, *herniarioides* (BM, K, MO, NY).
Brown, S. s.n. 'June 4, 1914', *forgeti* (K).
Bunting, G.S. & Licht 1019, *glabra* (NY, US).
Burger, W.C. 3240, *acuminata* (F, NY); 3858, *microphylla* (F, MEXU); 4148, *acuminata* (F); 7977, *auriculata* (F); 8326, *cornuto-cucullata* (F).
Burger, W.C. & Antonio, T. 10931, *microphylla* (BM, F).
Burger, W.C. & Baker, R. 9493, *auriculata* (F); 9726, *auriculata* (F).
Burger, W.C. & Barringer, K. 11616, *pubescens* (F).
Burger, W.C. & Burger, M. 7568, *conjugalis* (BM, F); 7594, *costaricensis* (MO); 7598, *costaricensis* (F); 7665, *parietaria* (F); 7668, *parietaria* (F); 7681, *vulcanica* (F); 7684, *vulcanica* (MO, NY); 7686, *vulcanica* (F, MEXU); 7711, *parietaria* (F, MO, NY); 7991, *parietaria* (F, MO); 8159, *parietaria* (F); 8175, *parietaria* (F, MEXU); 8183, *parietaria* (F).
Burger, W.C. & Gentry, J.L. 8360A, *pittieri* (F); 8501, *costaricensis* (F); 8506, *purulensis* (F, MO, NY); 8509, *pittieri* (F); 8510, *auriculata* (F); 8519, *auriculata* (F, NY); 8552, *pteropodon* (MEXU); 8630, *auriculata* (F); 8674, *pubescens* (F, MO, NY); 8697, *pittieri* (F); 8698, *angustifolia* (MO, NY); 8838, *pallida* (F, MO, NY); 8842, *pallida* (F); 8888, *pallida* (BM, F); 8914, *pallida* (MO, NY); 9029, *conjugalis* (F, MEXU, NY); 9069, *costaricensis* (BM); 9070B, *pittieri* (F); 9070E, *pittieri* (F); 9083, *imparifolia* (F); 9192, *conjugalis* (F); 9194, *costaricensis* (F); 9239, *pteropodon* (F, MO, NY); 9293, *ecboliophylla* (F, MO); 9295, *pteropodon* (F).
Burger, W.C. & Gómez-Laurito, J. 8252, *cornuto-cucullata* (F); 8359, *cornuto-cucullata* (F); 8381, *vulcanica* (F); 8387, *angustifolia* (F).
Burger, W.C. & Liesner, R. 6288A, *pittieri* (F); 6330, *tripartita* (CR, MO, NY, US); 6395, *auriculata* (BM); 6434, *auriculata* (F, MO, NY); 6509, *tripartita* (F, MEXU); 6709, *microphylla* (F); 6799, *conjugalis* (F, MO); 6805, *auriculata* (NY); 6966, *microphylla* (F, MO, NY); 7489, *cornuto-cucullata* (F).
Burger, W. C. & Stolze, R., 4902A, *pteropodon* (F); 4902B, *pteropodon* (F); 4989, *ecboliophylla* (F); 5010, *ecboliophylla* (MO); 5249, *auriculata* (F, NY); 5448, *pallida* (F); 5652, *pittieri* (MO, NY); 5657, *pittieri* (F); 5662, *costaricensis* (MEXU); 5715, *conjugalis* (F); 6077, *dauciodora* (F, MO).
Burger, W.C. & Visconti, G. 10210, *purulensis* (MEXU, MO); 10228, *pittieri* (F).
Burger, W.C. et al. 9396, *purulensis* (F); 9415, *acuminata* (F, MEXU); 10240, *vulcanica* (NY); 10244, *conjugalis* (F, MO); 10263, *pittieri* (F); 10301, *pteropodon* (F); 10383, indet. (F, MO); 10491, *ecboliophylla* (F, NY); 10754, *pittieri* (F, MEXU, MO, NY); 10789, *pittieri* (F); 10803, *angustifolia* (F); 10809, *vulcanica* (F); 11419, *auriculata* (F); 11908, *imparifolia* (F); 14088, cf. *centradenoides* (F, MO, NY).
Cabrera, E. & de Cabrera, H. 10785, *microphylla* (TEX).
Caec & Seler, G. 2516, *pubescens* (NY).
Calderón, S. 572, *microphylla* (GH, NY); 1412, *microphylla* (BM).
Calzada, J.I. 981, *hyalina* (F).
Campos V., A. 2615, *pubescens* (BM).
Carlson, M.C. 182, *microphylla* (F); 2130, *pleuroneura* (F); 3319, *microphylla* (F).
Carvajal, A. 151, *pittieri* (MO).
Castro, D. 2234, *microphylla* (MO).
Cedillo T., R. & Torres C., R. 1903, *tridentata* (MEXU, MO).
Chacón, A. 247, *pallida* (BM); 545, *vulcanica* (BM).
Chavarría, U. 29, *microphylla* (ITIC); 197, *microphylla* (MO).
Chavarría, U. et al. 28, *ecboliophylla* (BM).
Chinchilla, F. & Sandoval 275, *microphylla* (B, F, LAGU).
Chorley, M. 208, *hyalina* (BM); 316, *dauciodora* (BM).
Chorley, M. & Atkinson, R. 82, *hyalina* (BM).
Chrysler 5520a, *pubescens* (F).
Churchill, H.W. & Churchill, A. 6047, *purulensis* (MO).
Churchill, H.W. et al. 4694, indet. (MO).
Churchill, S. 5746, *purulensis* (BM).
del Cid 1790, *herniarioides* (ITIC).
Clare, T. 118, *cadierei* (MO).
Clark, O.M. et al. 3967, *pansamalana* (TEX).
Clarke, O.F. 271, *irrorata* (LL, NY); 345, *mexicana* (NY).
Clewell, A. & Hazlett, D. 3935, *hyalina* (MO, US).
Contreras, E. 200, *parietaria* (LL); 243, *microphylla* (LL); 1139, *microphylla* (LL); 1195, *microphylla* (LL); 2173, *pubescens* (LL); 2939, *senarifolia* (LL); 4778, *pansamalana* (LL); 5259, *microphylla* (LL); 5646, *microphylla* (F); 6222, cf. *pubescens* (LL); 6590, *glabra* (LL); 7091, *pansamalana* (LL); 7850, *pubescens* (LL); 10895, *purulensis* (LL, MEXU, MO); 11227, *purulensis* (LL, MO).
Cook, O.F. & Doyle 181, *angustifolia* (US).
Cook & Griggs 609, *chiapensis* (US).
Cooper, G. 73, *hyalina* (NY).
Cooper, G.P. 546, *acuminata* (US); 577, *acuminata* (US).
Cooper, J.J. 5948, *parietaria* (GH); 5950, *vulcanica* (GH); 5952, *costaricensis* (K, US); s.n., *hyalina* (F).
Correa A. & Dressler, R. 884, *daguensis* (F, MO); 886, *forgeti* (MO).
Correa A. et al. 2627, *pubescens* (F, NY); 2812, *purulensis* (MO).
Cosson 25, *microphylla* (P).
Cowan, C.P. & Magaña A. 3142, *ecboliophylla* (MEXU, NY).
Cowan, C.P. et al. 3978 (TEX), *pteridophylla* (TEX).
Cowell, J.F. 258, *microphylla* (NY); 282, *microphylla* (NY).
Crawford 574, *involucrata* (NY).
Croat, T.B. 991, *pubescens* (MO); 10572, *parietaria* (GH, MO); 14298, *centradenoides* (MO); 15790, *purulensis* (GH); 16185, *microphylla* (MO);

22383, *conjugalis* (GH); 22920, *centradenoides* (GH); 23830, *microphylla* (MO); 24316, *microphylla* (MO); 24519, *microphylla* (MO); 26267, *parietaria* (MO); 27378, *pteropodon* (MO); 27556, *purulensis* (US); 27768, *imparifolia* (MO, US); 27776, *pteropodon* (MO); 34207, *corona* (MO); 34865, *cornuto-cucullata* (MO); 34892, *pubescens* (MO); 35271, *imparifolia* (MO); 35279, *pteropodon* (MO, US); 35469, *parietaria* (MO); 35514, *parietaria* (MO); 35598, *pteropodon* (MO); 35723, aff. *latifolia* (MO); 35846, *pittieri* (MO); 36171, *acuminata* (MO); 36242, *acuminata* (MO); 36811, *pallida* (MO); 36941, *rostulata* (MO); 36983, *daguensis* (MO); 40838, *irrorata* (MO); 40878, *pubescens* (MO); 40964, *dauciodora* (MO); 41186, *purulensis* (MO); 41323, *pubescens* (MO); 41331, *purulensis* (MEXU, MO); 41566, *glabra* (MO); 42434, *dauciodora* (MO); 43019, *microphylla* (MO); 43025, *microphylla* (MO); 46348, *mexicana* (MO); 47768, *mexicana* (MO); 48513, *purulensis* (MO); 48544, *purulensis* (MO); 48785, *purulensis* (MO, NY); 49935, *digitata* (BM, MO); 50081, *purulensis* (MO); 60153, *purulensis* (BM); 67006, *fasciata* (MO); 67288, *imparifolia* (BM); 67556, *purulensis* (MO); 67791, *pubescens* (BM); 68130, *pittieri* (BM); 68745, *purulensis* (MO); 68782, *pteropodon* (BM); 74816, *centradenoides* (BM); 74900, *auriculata* (BM); 74916, *purulensis* (BM); 78594, *chiapensis* (BM).

Croat, T.B. & Grayum, M. 59944, *purulensis* (BM); 60041, *digitata* (MO); 60315, *digitata* (BM, MO); 60380, *purulensis* (BM); 68236, *conjugalis* (BM).

Croat, T.B. & Hannon, D.P. 64371, *pubescens* (BM).

Croat, T.B. & Zhu, G. 76516, purulensis (BM); 76815, *pubescens* (BM); 77220, *magnicarpa* (BM, MO).

D'Arcy, W.G. 5318, *vulcanica* (BM); 10005, *tripartita* (MO); 10472, *pubescens* (MO); 10716, *vulcanica* (MO, US); 10807, *auriculata* (US); 10912, *purulensis* (MO); 10989, *cornmanae* (BM, NY); 11254, *rostulata* (MO); 11258, *fasciata* (MO).

D'Arcy, W.G. & D'Arcy, J. 6839, *microphylla* (MO).

D'Arcy, W.G. & Hammel, B. 12448, *cornuto-cucullata* (BM, MO).

D'Arcy, W.G. et al. 12839, cf. *gracilipes* (BM); 12856, *vulcanica* (MO); 12860, *vulcanica* (MO); 12910, *auriculata* (BM); 13170, *auriculata* (MO).

Dajaes 21732, *acuminata* (C).

Danin, A. 762510, *microphylla* (MO).

Darwin, S.P. 2291, *microphylla* (F).

Davidse, G. 35657, *pubescens* (BM); 35823, *glabra* (BM); 36029, *pubescens* (BM); 36391, *glabra* (BM); 36392, *pubescens* (BM, MO); 36885, *pubescens* (BM, MO); 36985, pubescens (BM, MO).

Davidse, G. & Brant, A. 32312, *microphylla* (BM).

Davidse, G. & Buchanan, H.B. 36893, aff. *pubescens* (BM).

Davidse, G. & D'Arcy, W.G. 10282, *vulcanica* (MO).

Davidse, G. & Herrera, G. 26254, *angustifolia* (BM); 29146, *glabra* (MO); 29151, *pteropodon* (BM); 31134, *fasciata* (BM).

Davidse, G. & Pohl, J.E. 1198, *parietaria* (F, GH, MO); 1528, *cornmanae* (GH); 1623, *cornuto-cucullata* (MO, US); 1660, *digitata* (MO); 1682, *pittieri* (GH, MO).

Davidse, G. et al. 23158, *purulensis* (BM); 29644, *microphylla* (BM); 37219, aff. *vulcanica* (BM).

Davidson, M.E. 56, *purulensis* (F, GH, US); 102, *pansamalana* (GH); 179, *vulcanica* (F); 214, *auriculata* (F, GH); 267, *costaricensis* (F); 335, *rugosissima* (F, GH); 549, *parietaria* (F, GH, MO, US); 717, *costaricensis* (F, US); 860, *pubescens* (F, MO, US); 1027, *vulcanica* (F, GH, MO).

Dawe, M.T. 264, *lindeniana* (K).

Diaz Z. 128, *hyalina* (MO).

Dodge, C. & Goerger, V.F. 9065, *vulcanica* (MO).

Dodge, C. & Thomas, W.S. 4370, *pallida* (GH, MO).

Donnell Smith, J. 1670, *microphylla* (NY); 2494, *microphylla* (GH, NY); 2516, *pubescens* (GH); 2751, *irrorata* (US); 2892, *parietaria* (F); 2907, *pubescens* (F); 6779, *pteropodon* (US); 6780, *pteropodon* (US); 7467, *purulensis* (GH, US).

Dressler, R. 1529, *pubescens* (MEXU); 3457, *centradenoides* (F, MO); 3458, *centradenoides* (MO); 3459, *centradenoides* (F, MO); 4056, *rostulata* (BM, MO); 4217, *forgeti* (MO); 4469, *gomeziana* (F, NY).

Dressler, R. & Jones, Q. 47, *pubescens* (BM).

Droege, H. & Diaz 23001, *purulensis* (MEXU); 23002, *purulensis* (BM).

Dryer, V. 35, *auriculata* (F); 36, *pittieri* (F); 83, *auriculata* (F); 84, *angustifolia* (F); 92, *pteropodon* (F); 145, *pittieri* (F); 284, *angustifolia* (F); 1129, *auriculata* (F); 1151, *vulcanica* (F).

Duke, J.A. 12164(1), *imparifolia* (MO); 13020, *microphylla* (MO); 14193, aff. *nummulariifolia* (GH, MO); 15578(1), *imparifolia* (US); 15578(2), *imparifolia* (MO); 15644(2), *pteropodon* (MO); 15654, aff. *latifolia* (GH, MO); 15671(2), *digitata* (MO).

Duke, J.A. & Bristan, N. 98, *forgeti* (MO); 8202, *forgeti* (MO).

Duke, J.A. & Correa, M. 14668(2), *imparifolia* (MO).

Duke, J.A. & Elias, T. 13698, *digitata* (MO).

Dunlap, V.C. 387, *microphylla* (F); 399, *hyalina* (F); 428, *pubescens* (F).

Dwyer, J.D. 8859, *imparifolia* (MO); 15269, *dauciodora* (MO); 15352, *irrorata* (MO).

Dwyer, J.D. & Hayden, S.M.V. 7655, *parietaria* (MO); 7723, *purulensis* (GH, MO).

Dwyer, J.D. & Lallathin, B. 8768, cf. *plumulosa* (MO).

Dwyer, J.D. & Liesner, R. 12099, *microphylla* (MO, US).

Dwyer, J.D. et al. 4495, *centradenoides* (MO).

Ebinger, J. 31, *microphylla* (F, MEXU, US); 966, *acuminata* (F).

Elias, T. 13765, *daguensis* (MO).

Endres, A. 172, *pteropodon* (BM); 174, *angustifolia* (BM); 199, *pteropodon* (BM); 253, *hyalina* (BM).

Espinoza 216, *glabra* (BM).

Fasset 28291, *dauciodora* (F, GH, ITIC).

Feiffer B. et al. 1157, *dauciodora* (BM, LAGU).

Felix 108, *dauciodora* (P).

Fendler, A. 259, *microphylla* (MO); 1246, *dauciodora* (K); 1247, *dauciodora* (K).

Fisher, G.L. 35288, *pubescens* (F, P).

Flores, J.S. 5, *microphylla* (F); 8075, *microphylla* (MEXU).

Folsom, J.P. 1212, *magnicarpa* (MO); 1266, *magnicarpa* (MO); 3057, *corona* (MO); 3112, *centradenoides* (MO); 3226, *pteropodon* (MO); 3410, *daguensis* (MO); 3498, *quadrata* (MO); 3498A, *forgeti* (BM); 3894, *daguensis* (MO); 4204, *digitata* (MO); 4375, *daguensis* (MO); 4384, *pteropodon* (MO).

Folsom, J.P. & Button, R. 3288, *magnicarpa* (MEXU, MO).

Folsom, J.P. & Robinson, R. 2377, *imparifolia* (MO).

Folsom, J.P. et al. 2226, *parietaria* (MO); 2239, *rugosissima* (BM, MO); 2253, *purulensis* (BM); 4649, *purulensis* (MO); 4685, cf. *purulensis* (MO); 4807, *pubescens* (LL); 6739, *imparifolia* (MO, NY); 7097, *pteropodon* (MO).

Forsther 10110(132), *pleuroneura* (BM, MSB); 10120(421), *purulensis* (BM, MSB).

Foster, R.B. & Augspurger, C. 2835, *imparifolia* (F).

Galeotti, H. 313, *acuminata* (P); s.n., *acuminata* (P).

Garibaldi, C. et al. 2789, *pubescens* (MO).

Garnier, A. A345, *hyalina* (US); A1310, *hyalina* (GH).

Garwood N.C. et al. 426, *acuminata* (BM, F); 1367, *auriculata* (BM); 1393, *vulcanica* (BM).

Gaspari s.n. '26 August 1848', *involucrata* (K).

Gaumer, G.F. 455, *microphylla* (BM, F, MO, NY); 845, *microphylla* (MO); 1199, *microphylla* (F); 1338, *microphylla* (BM, C, F, GH, MO); 1775, *microphylla* (C, GH, MO); 2240, *microphylla* (GH, MO); 2268, *microphylla* (BM, C, F); 2318, *microphylla* (F); 2473, *microphylla* (F); 2740, *microphylla* (F).

Gentle, P.H. 6318, *microphylla* (LL); 7147, *microphylla* (LL); 7266, *glabra* (LL); 7337, *pubescens* (LL); 7388, *glabra* (LL); 9207, *pubescens* (LL).

Gentry, A. 2282, *herniarioides* (MO); 6732, *involucrata* (MO); 7592, *pubescens* (US); 7928, *pubescens* (F, MO).

Gentry, A. & Clewell, A. 7112, *digitata* (MO).

Gentry, A. & Mori, S. 13576, *herniarioides* (F, MO); 13630, *imparifolia* (MO); 14045, *imparifolia* (MO); 14056, *digitata* (F, MO).

Gereau, R.E. 2101, *quercifolia* (MO).

Gereau, R.E. et al. 2194, *microphylla* (BM).

Gillis, W.T. & Plowman, T. 10104, *pteropodon* (GH).

Gilly, C.E. & Hernandez X., E. 283, *ecboliophylla* (GH, MEXU, TEX).

Godfrey, R. 66037, *hyalina* (MO); 66148a, *conjugalis* (MO); 66371, aff. *purulensis* & aff. *cornuto-cucullata* (MO); 67255, *acuminata* (MO); 67263, *pteropodon* (MO).

Gómez, L.D. 19268, *auriculata* (BM); 19272, *conjugalis* (BM).

Gómez, L.D. et al. 21710, *vulcanica* (BM); 21901, *nummulariifolia* (BM); 22407, *vulcanica* (BM).

Gómez Laurito, J. 8544, *auriculata* (F); 8837, *pteropodon* (F); 24121, *microphylla* (BM).

Gómez Laurito, J. et al. 20995, *pittieri* (BM); 23145, *pteropodon* (BM); 23430, aff. *digitata* (BM).
Gómez P., L.D. 2188, *pallida* (F, MEXU); 2195, *pteropodon* (F, MO, NY); 2529, *mexicana* (MEXU); 3304, *gomeziana* (F, MO, NY).
Gonzalez 56, *pteropodon* (MO).
Gonzalez L. 1435, *hyalina* (ITIC).
Goudot, J. s.n. 'Decembre', *lindeniana* (K); s.n. '1844', *involucrata* (P).
Grant, M. 1047, *hyalina* (GH).
Grayum, M. 3324, *pteropodon* (BM); 3335, *angustifolia* (MO); 3388, aff. *quercifolia* (BM); 3405, *imparifolia* (BM); 5085, *pittieri* (BM); 5383, *imparifolia* (BM); 6436, *rugosissima* (MO); 6460, *vulcanica* (BM); 7044, *purulensis* (BM); 7097, *auriculata* (BM); 7106, *conjugalis* (BM); 7183, *vulcanica* (BM); 7281, *tripartita* (CR); 7366, *pteropodon* (BM); 7917, *hyalina* (BM); 9775, *imparifolia* (BM); 10298, cf. *vulcanica* (BM).
Grayum, M. & Hammel, B. 5534, *pubescens* (BM); 10521, cf. *latifolia* (BM).
Grayum, M. & Murakami, N. 9943, *pubescens* (BM).
Grayum, M. & Schatz, G. 5272, *pteropodon* (BM).
Grayum, M. & Sleeper, P. 3273, *glabra* (BM); 3465, *costaricensis* (BM).
Grayum, M. et al. 4532, *conjugalis* (BM); 4553, *purulensis* (MO); 4898, *glabra* (BM); 8281, *acuminata* (BM).
Grijalva, A. 2871, pubescens (BM, MO).
Grijalva, A. & Burgos, F. 1679, *hyalina* (MO); 1718, *microphylla* (MO).
Grijalva, A. & Grijalva, M.V. 1468, *hyalina* (MO); 1470, *microphylla* (BM, MO).
Guzman, M. & Castro, D. 1495, *microphylla* (MO); 1556, *microphylla* (BM, MO); 1973, *microphylla* (MO); 2040, *hyalina* (MO).
Guzman, M. et al. 773, *hyalina* (MO); 801, *pubescens* (BM, MO); 947, *pubescens* (BM, MO); 1322, *hyalina* (BM, MO).
Haber, Wm. 1502, *acuminata* (MO).
Haber, Wm. & Bello, C., E. 1675, *imparifolia* (MO); 1982, *imparifolia* (MO); 3169, *pittieri* (MO).
Haber, Wm. & Cruz, E. 7007, *imparifolia* (BM); 8427, *imparifolia* (BM).
Haber, Wm. & Zuckowski, W. 10892, *microphylla* (MO).
Haber, Wm. et al. 4472, *pittieri* (MO); 5504, *imparifolia* (MO).
Haber, Wm. ex Bello C., E. 4910, *acuminata* (MO); 6456, *purulensis* (MO).
Hagen, C. von & Hagen, W. von 2010, *cornmanae* (NY, US).
Hahn, L. 65, aff. *glabra* (P); 208, *microphylla* (MO).
Hall, S.H. & Bockus, S.M. 7907, *pubescens* (MO).
Hamilton, C. & Krager, K. 3736, *vulcanica* (BM); 4010, *adamsiana* (MO).
Hamilton, C. & Stockwell, H. 3607, *parietaria* (BM).
Hammel, B. 950, *magnicarpa* (MO); 1031, *magnicarpa* (MO); 1439, *conjugalis* (MO); 2024, *auriculata* (NY); 2078, *fasciata* (MO); 2191, *digitata* (MO); 2424, *magnicarpa* (MO, NY); 2613, *magnicarpa* (MO); 2669, *forgeti* (MO); 2678, *forgeti* (MO); 2695, *daguensis* (MO); 2869, *vulcanica* (MO); 2900, *vulcanica* (MO); 2988, *vulcanica* (MO); 3146, *fasciata* (MO); 3216, *rostulata* (MO); 3337, *pteropodon* (MO); 3384, *fasciata* (MO); 3481, *magnicarpa* (MO); 3578, *digitata* (MO); 4014, *magnicarpa* (MO); 4077, *imparifolia* (BM); 4138, *magnicarpa* (MO); 4592, *tutensis* (MO); 4648, *corona* (MO, NY); 4702, *adamsiana* (MO); 5173, *pteropodon* (MO); 5188, *fasciata* (MO); 5746, *purulensis* (BM, MO); 5798, *rugosissima* (MO); 6118, *cornmanae* (BM); 6141, *cornmanae* (MO); 7174, *imparifolia* (MO); 7282, *centradenoides* (MO); 15366, *pubescens* (BM).
Hammel, B. & D'Arcy, W.G. 5024, cf. *involucrata* (MO).
Hammel, B. & Trainer, J. 14000, *parietaria* (MO); 14013, *acuminata* (MO).
Hammel, B. et al. 6618, *vulcanica* (MO); 6670, *vulcanica* (MO); 14646, *trichomanophylla* (MO); 15247, *acuminata* (MO); 15249, *imparifolia* (MO); 15268, *tilarana* (MO); 15643, *tridentata* (MO); 15644, *killipiana* (MO); 16378, *imparifolia* (MO); 16394, *forgeti* (BM); 17546, *pallida* (BM).
Hampshire, R. & Whitefoord, C. 83, *purulensis* (BM); 184, *purulensis* (BM); 189, *digitata* (BM, MO, PMA); 192, *purulensis* (BM); 290, *purulensis* (BM); 318, *corona* (BM); 529, *purulensis* (BM); 694, *digitata* (BM, PMA); 767, *purulensis* (BM).
Hampshire, R. et al. 698, *vulcanica* (BM).
Hanan A. 438, *pteridophylla* (MEXU); 444, *chiapensis* (MEXU); 492, *pubescens* (MEXU); 680, *ecboliophylla* (MEXU).
Harmon, W.E. & Dwyer, J.D. 3115, *microphylla* (NY); 4006, *pubescens* (MO).
Hatch, W.R. & Wilson, C.L. 162, *tridentata* (F); 202, *pansamalana* (F).
Hatheway, W.H. 1322, *parietaria* (F); 1375, *vulcanica* (BM, F).
Hawkes, J.G. et al. 2070, *pubescens* (F).
Hawkins, T. 1029, *pubescens* (BM, MO).
Hayes, S. 898, *microphylla* (NY).
Hazlett, D.L. 5011, *vulcanica* (F).
Hazlett, D.L. & Brant, A.E. 8099, *ecboliophylla* (BM).
Heath, M. 924, *vulcanica* (MEXU).
Hedger 78, *microphylla* (BM).
Helvetia 12463, *hyalina* (F).
Henshold, N. 1114, aff. *centradenoides* (BM); 1126, aff. *centradenoides* (BM).
Hepper, D.N. 90, *pubescens* (BM); 98, *pittieri* (BM); 124, *hyalina* (BM).
Hernandez A. et al. 209, *pubescens* (F).
Hernandez G., H. 151, *purulensis* (MO); 225, *microphylla* (BM); 1542, *mexicana* (BM).
Herrera, G. 1305, *ecboliophylla* (BM); 1739, *ecboliophylla* (BM); 1874, *pteropodon* (BM); 1897, *imparifolia* (BM); 2955, *microphylla* (BM); 3078, *pubescens* (BM); 3163, *microphylla* (BM); 3440, *vulcanica* (BM); 3752, *tripartita* (BM, CR, MO); 3851, *purulensis* (BM); 5122, *microphylla* (MO); 5308, *cornmanae* (BM, MO); 5516, *purulensis* (F).
Herrera, G. & Chacón, A. 2635, *pittieri* (BM); 2658, aff. *tridentata* (BM); 2795, *purulensis* (BM).
Herrera, G. & Madrigal, E. 2608, *pallida* (BM).
Herrera, G. & Rivera, G. 862, *pubescens* (BM).
Herrera, G. & Robles, R. 812, *glabra* (BM).
Herrera, G. & Solis, M. 2478, *pubescens* (BM).
Herrera C. et al. 569, *pteropodon* (BM); 578, *pittieri* (BM); 580, *ecboliophylla* (BM).
Heusden, van 4962, *vulcanica* (F).
Heyde, A. & Lux, E. 3142, *hyalina* (GH, MO, NY, P); 3145, *senarifolia* (GH, MO, NY); 3146, *dauciodora* (GH, MO, NY, P); 3147, *mexicana* (K); 3148, *vulcanica* (GH); 6234, *herniarioides* (GH).
Hime, J. & Gordon, I. 174, *fasciata* (MO).
Holland, D.L. & Kid, B. 102, *glabra* (BM, MO).
Holm, R.W. & Iltis, H.I. 24, *glabra* (F, GH, NY, P); 34, *auriculata* (P); 521, *dauciodora* (GH, P).
Holme 4356, *ecboliophylla* (NY).
Holst, B.K. 5328, *glabra* (BM); 5329, *pubescens* (BM).
Holton, I.F. 256, *involucrata* (K).
Huft, M. 1940, *pallida* (BM, MO).
Huft, M. & Barringer, K. 2020, *auriculata* (MO); 2049, *auriculata* (F, MO).
Ibarra M. et al. 3844, *daguensis* (BM).
Jaramillo M. & van der Harmen 2766, *lindeniana* (K).
Jimenez M., A. 620, *pittieri* (F); 623, *pittieri* (F); 1010, *glabra* (F); 1954, *pittieri* (F, NY); 1996, *auriculata* (F); 3246, *dauciodora* (F); s.n., *dauciodora* (F).
Jimenez M., A. & Cruz 155, *vulcanica* (F).
Jones, G.C. & Facey, L. 3453, *microphylla* (NY).
Kellerman, W.G. 4849, *hyalina* (MEXU).
Kennedy, H. 619, *pteropodon* (F); 3255, *ecboliophylla* (MO).
Kennedy, H. & Guindon, W. 3705, *angustifolia* (F).
Kennedy, H. et al. 3193, *centradenoides* (MO).
Khan, T. et al. 33, *microphylla* (BM); 311, *cadierei* (BM); 621, *hyalina* (BM); 811, *auriculata* (BM).
Killip, E.P. 3543, *cornmanae* (US); 3546, *purulensis* (US); 3562, *purulensis* (US).
Kirkbride, J. Jr 1121, *centradenoides* (MO).
Kirkbride, J. Jr & Duke, J.A. 414, *pteropodon* (MEXU, MO, NY); 759, *purulensis* (NY); 768, *costaricensis* (NY); 821, *fasciata* (MO); 944, *plumulosa* (MO, NY); 1204, *imparifolia* (MO, NY); 1241, *daguensis* (MO, NY); 1336, *digitata* (MO, NY).
Knapp, S. 1091, *purulensis* (LL, MO); 1622, *rugosissima* (MO); 5330B, *imparifolia* (MO).
Knapp, S. & Mallet, J. 3187, *pubescens* (MO); 4672, *centradenoides* (BM, MO); 4673, *centradenoides* (MO); 4700, *forgeti* (BM).
Knapp, S. & Sytsma, K. 2593, *purulensis* (BM, LL, MEXU, MO); 2600, *tutensis* (MO).
Knapp, S. & Vodicka, M. 5639, *digitata* (MO).
Knapp, S. et al. 2023, *purulensis* (BM, LL); 2024, *purulensis* (BM); 2097,

auriculata (BM); 2105, *rugosissima* (MO); 2114, *conjugalis* (MO); 2128, *purulensis* (BM, MO); 2141, *purulensis* (BM, MO); 4038, *purulensis* (MO); 4045, *fasciata* (MO); 4046, *fasciata* (MO); 4047, *fasciata* (BM, MO); 4138, *purulensis* (BM); 4256, *conjugalis* (MO); 4541, *centradenoides* (MO).

Koptur, S. 124, *pittieri* (MO).

Krukoff, B. 21811, *hyalina* (MO).

Krukoff, B. & Stevens 3384, *pubescens* (MO); 22132, *pubescens* (BM, MO); 22463, *pubescens* (BM, MO); 23206, *microphylla* (BM, MO); 23313, *microphylla* (MO); 23379, *pubescens* (MO).

Kuntze, O. 2108, *pubescens* (NY); 2147, *pubescens* (NY).

La Frankie, J.V. 1052, *acuminata* (GH); 1188, *acuminata* (GH).

Lagos 1909, *dauciodora* (ITIC).

Lankester, C.H. K22, *pubescens* (F); 256, *parietaria* (F).

Lathrop, E. 6769, *pubescens* (MEXU).

Lawton, R. 1164, *imparifolia* (F); 1230, *auriculata* (F).

Le Clezio 11, *forgeti* (MO); 252, *microphylla* (MO); 261, *hyalina* (MO).

Lent, R. 434, *imparifolia* (F); 690, *glabra* (F, MO); 746, *auriculata* (F); 844, *acuminata* (F, MEXU); 845, *pittieri* (F, MO, NY); 921, *costaricensis* (F); 1457, *auriculata* (F); 1590, *imparifolia* (NY); 1606, *parietaria* (F, MO, NY); 1818, *conjugalis* (F); 1852, *auriculata* (F, NY); 1997, *pubescens* (F); 2007, *involucrata* (MEXU, MO); 2017, *pittieri* (F); 2018, *pittieri* (F); 2019, *pittieri* (F, NY); 2047, *parietaria* (F); 2077, *parietaria* (F); 2084, *auriculata* (F, MEXU); 2085, *auriculata* (F); 2417, *pittieri* (MEXU); 2505, *imparifolia* (F); 2590, *tilarana* (F); 2621, *pteropodon* (F); 2696, *vulcanica* (F); 2797, *parietaria* (F); 2801, *parietaria* (F, US); 2807, *angustifolia* (F); 2829, *parietaria* (F); 2847, *auriculata* (F, MO); 3210, *auriculata* (MEXU); 3241, *acuminata* (F, MO, NY); 3256, *imparifolia* (F); 3515, *ecboliophylla* (MEXU, MO); 3516, *pteropodon* (F); 3517, aff. *pteropodon* (F); 3571, *auriculata* (MEXU, MO); 3572, *conjugalis* (F); 3684, cf. *pallida* (F); 3817, *purulensis* (F); 3903, *vulcanica* (F, MO); 3967, *parietaria* (F, MEXU).

León, J. 733, *pubescens* (F).

Lewis, W.H. 6888, *microphylla* (MEXU, MO).

Lewis, W.H. et al. 326, *microphylla* (US); 895, *pubescens* (MO); 1718, *centradenoides* (GH, MO); 1727, *imparifolia* (MO).

Liebmann, F.M. 14238 '2', *acuminata* (C); 14241, *falcata* (C, F); 14242, *acuminata* (C); 14243, *hyalina* (C); 14254, *hyalina* (C); 14256, *vulcanica* (C); 14329, *auriculata* (C); 14339 '1', '2', *parietaria* (C); 21729, *acuminata* (C, NY); s.n., *acuminata* (P); s.n., *pubescens* (GH, P); s.n., *pubescens* (P).

Liesner, R. 300, *vulcanica* (LL); 727, *pteropodon* (GH); 1195, *quadrata* (GH, LL, MO, P, US); 1232, *forgeti* (GH, MO); 1239, *centradenoides* (GH, MO); 1767, *acuminata* (GH); 3123, *pallida* (MO); 3160, *pallida* (MO); 14093, *ecboliophylla* (BM); 14184, *microphylla* (BM); 14212, *hyalina* (MO); 14247, *pubescens* (BM); 15427, *pallida* (MEXU); 26210, aff. *pubescens* (MO); 26221, cf. *vulcanica* (BM); 26538, *quercifolia* (MO); 26598, *pubescens* (BM); 26741, *glabra* (BM).

Liesner, R. & Judziewicz, E. 14487, *vulcanica* (BM); 14666, *pittieri* (MO); 14713, *pittieri* (MO); 14751, *pteropodon* (BM); 14796, *pittieri* (MO); 14805, aff. *pallida* (MO); 14807, *pittieri* (BM); 14907, *angustifolia* (BM).

Liesner, R. et al. 15147, *ecboliophylla* (BM, MEXU); 15276, *glabra* (BM); 15409, *pteropodon* (MO); 15468, *pteropodon* (BM); 15567, *angustifolia* (MO); 15598, *pteropodon* (MO).

Linden, J.J. 71, *pubescens* (FI-W); 183, *mexicana* (K); 651, *mexicana* (P); 799, *lindeniana* (BM, K, P); 7222, *mexicana* (NY).

LINN -1220.8, *microphylla* (LINN); -1111.25, *parietaria* (LINN).

Loiselle, B.A. 234, aff. *purulensis* (MO); 312, *pteropodon* (MO).

Long, R.W. 3261, *microphylla* (MO).

Lopez L., R. & Martin, G.J. 175, *purulensis* (MO); 208, *pubescens* (MO).

Lorence & Cedillo 672, *purulensis* (MEXU).

Lund, P.W. s.n., *hyalina* (C); s.n. '1', *pubescens* (C).

Lundell, C.L. 330, *pubescens* (F); 845, *microphylla* (F, GH, MO, NY); 6520, *pubescens* (F, LL, NY, US); 15339, *microphylla* (LL); 16263, *daguensis* (LL).

Lundell, C.L. & Contreras, E. 19593, *purulensis* (LL); 20949, *purulensis* (LL); 20974, aff. *imparifolia* (LL).

Luriuz C. 730, *microphylla* (F).

Luteyn, J.L. 703, *ecboliophylla* (MO).

Maas, P.J.M. 1091, *angustifolia* (F); 1155, *parietaria* (F); 1172, *acuminata* (F).

Maas, P.J.M. & Dressler, R. 1621, *corona* (F, MO); 1630, *pteropodon* (F, MO); 4842, *conjugalis* (F); 4880, *auriculata* (F); 4881, *vulcanica* (F); 4995, *rugosissima* (F); 5030, *tutensis* (F).

Maas, P.J.M. & Hammel, B. 7807, *purulensis* (BM).

Maas, P.J.M. & McAlpin, B. 1482, *vulcanica* (MO).

Magaña A., M.A. & Zamudio, S. 270, *mexicana* (MEXU); 327, *pubescens* (MEXU); 334, *chiapensis* (MEXU).

Maj 1887, *parietaria* (GH, NY).

Manriquez, I., G. et al. 3735, *pubescens* (BM).

Manzanares, R. 10, *microphylla* (ITIC).

Marineros, L.E. 40, *microphylla* (BM).

Mart 4933, *pubescens* (GH).

Martinez, H.A. 27, *microphylla* (BM).

Martinez C. 308, *pubescens* (BM); 876, *irrorata* (BM); 877, *pubescens* (BM).

Martinez S., E.M. 20771, *dauciodora* (BM).

Martinez S., E.M. & Grijalba, A. 1880, *pubescens* (MEXU).

Martinez S., E.M. & Reyes, A. 22028, *microphylla* (MEXU).

Martinez S., E.M. & Sandino 1505, *pubescens* (MEXU).

Martinez S., E.M. et al. 8545, *pubescens* (BM); 13170, *dauciodora* (BM); 14100, *dauciodora* (MEXU).

Martius, K.F.P. von s.n. '1827', *rhizobola* (K); s.n. 'Solimoês fluvium, Rio Negro', *imparifolia* (M).

Matuda, E. 103, *glabra* (MEXU); 116, *pubescens* (MEXU); 1120, *acuminata* (GH); 1316, *microphylla* (F); 1322, *vulcanica* (GH); 1745, *pubescens* (GH, NY); 2334, *dauciodora* (LL, MEXU, MO); 2360, *quercifolia* (MEXU); 2573, *quercifolia* (GH, MEXU, NY); 2899, *auriculata* (LL, MEXU); 2903, *dauciodora* (MEXU); 3462, *pubescens* (F, LL, MEXU, NY); 4043, *hyalina* (MEXU); 4198, *glabra* (F, MEXU, NY); 4341, *quercifolia* (F, GH, LL, MEXU, MO, NY); 4607, *dauciodora* (F, LL, MEXU, MO, NY); 4797, *quercifolia* (F, GH, LL, MEXU, MO); 16424, *microphylla* (F, MEXU); 17178, *hyalina* (F, MEXU); 17761, *glabra* (F, MEXU); 17878, *glabra* (F); 17895, *pubescens* (F, MEXU); 28514, *skutchii* (MEXU); 28515, *dauciodora* (MEXU); 28574, *microphylla* (MEXU).

Maxon, W.R. 309, *vulcanica* (NY); 5426, *vulcanica* (F).

Maxon, W.R. & Harvey, A.D. 8132, *auriculata* (GH); 8182, *auriculata* (US); 8206, *auriculata* (US); 8255, *parietaria* (GH); 8356, *parietaria* (US).

Maxon, W.R. & Hayes 8256, *auriculata* (C).

Maxwell, R.H. 219, *daguensis* (MO).

Maya J., S. 556, *pubescens* (BM); 906, *microphylla* (BM); 3382, *microphylla* (BM).

McDaniel, S. 12890, *microphylla* (F).

McPherson, G. 6710, *digitata* (MO); 8637, *fasciata* (MO); 10550, *digitata* (MO); 12205, *digitata* (MO).

Meave del C., J. et al. 1530, aff. *imparifolia* (BM).

Melinon, M. 123, *imparifolia* (P).

Mendez, G., A. 7795, *daguensis* (BM); 8269, *pubescens* (BM).

Mendez, T., A. 6103, *microphylla* (BM); 6412, *pubescens* (BM); 6531, *microphylla* (BM); 6552, *pubescens* (BM); 6553, *pubescens* (BM).

Mendez T., A. & Concepcion M., M. 9858, *glabra* (TEX).

Mendoza, R. et al. 264, *digitata* (US).

Mexia, Y. 767, *microphylla* (BM).

Meyer, F.G. & Rogers, D.J. 2765, *microphylla* (BM); 2845, *glabra* (BM).

Meyer, W. 135, *microphylla* (F).

Miller & Nee 1437, *microphylla* (BM); 1453, *hyalina* (BM, MO).

Miller & Sandino 1213, *pubescens* (BM, MO).

Millspaugh, C.F. 1473, *microphylla* (F).

Miranda, F. 1791, *irrorata* (MEXU); 6533, *pubescens* (MEXU); 6553, *mexicana* (MEXU); 6606, *ecboliophylla* (MEXU); 7863, *pubescens* (MEXU).

Molina A. 12, *dauciodora* (ITIC).

Molina R., A. 1497, *hyalina* (F); 3850, *hyalina* (F, GH, US); 5943, *hyalina* (F, LL); 8663, *parietaria* (F); 8804, *hyalina* (NY); 10130, *parietaria* (MO); 10862, *hyalina* (F); 10940, *glabra* (F, NY); 11048, *parietaria* (F, LL, NY); 12716, *dauciodora* (F, NY); 12893, *hyalina* (F, NY); 12945, *pubescens* (F, NY); 18456, *microphylla* (F, NY); 20670, *microphylla* (F, NY, US); 22119, *dauciodora* (BM, F); 22345, *dauciodora* (F, NY); 22909, *pubescens* (F); 23136, *microphylla* (F, NY); 25743, *dauciodora* (F, MEXU, MO); 25744, *dauciodora* (F); 25774, *quercifolia* (NY); 27431, *hyalina* (F, US); 27479, *cadierei* (BM, F, NY, US); 43286, *purulensis* (F).

Molina R., A. & Molina, A.R. 12151, *pansamalana* (F, LL, NY); 14057, *vulcanica* (NY); 24772, *hyalina* (F); 25704, *hyalina* (F); 27120, *hyalina* (F).
Molina R., A. et al. 17767, *auriculata* (F, NY); 18249, *hyalina* (F).
Monro, A.K. 756, *microphylla* (BM); 759, *hyalina* (BM).
Montalvo, E.A. 4125, *hyalina* (ITIC); 5039, *herniarioides* (ITIC); 6219, *herniarioides* (B, BM, LAGU, MO).
Montalvo, E.A. & Chavez 6277, *acuminata* (B, LAGU, MO).
Montalvo, E.A. & Menjivar 3669, *hyalina* (ITIC); 3856, *hyalina* (ITIC).
Montalvo, E.A. & Montalvo 4813, *dauciodora* (ITIC).
Montalvo, E.A. & Quintanilla 3434, *hyalina* (ITIC).
Moore 14252, *herniarioides* (C).
Moore H.E. Jr 14241, *falcata* (C, F); 2041, *parietaria* (C).
Morales, J.F. & Ramirez, V.H. 2492, *pteropodon* (BM).
Moreno, P.P. 2610, *hyalina* (MO); 2837, *hyalina* (MO); 3389, *hyalina* (BM, MO); 4195, *hyalina* (BM, MO); 4970, *pubescens* (MO); 9525, cf. *pubescens* (MO); 10214, *glabra* (BM, MO); 10318, *hyalina* (BM, MO); 10498, *microphylla* (MO); 10756, *hyalina* (MO); 11000, *microphylla* (MO); 11191, *microphylla* (BM, MO); 11289, *microphylla* (MO); 13135, *pubescens* (MO); 13786, *hyalina* (MO); 17045, *pubescens* (MO); 17154, *hyalina* (MO); 19643, *pubescens* (MO); 19839, *pubescens* (MO); 21744, *glabra* (BM, MO); 23831, *microphylla* (MO); 24921, *pubescens* (BM); 25107, *pubescens* (MO).
Moreno, P.P., & Robleto, W. 20497, *glabra* (MO).
Moreno, P.P. & Sandino, J.C. 12963, *ecboliophylla* (BM); 12986, *pubescens* (MO).
Moreno, P.P. et al. 24684, *microphylla* (MO).
Mori, S. 6666, *pteropodon* (MO).
Mori, S. & Crosby, M. 6338, *daguensis* (MO).
Mori, S. & Kallunki, J. 2521, *corona* (NY); 3234, *pteropodon* (MO); 5478, *digitata* (MO); 5736, *vulcanica* (US); 6041, *centradenoides* (MO, US).
Mori, S. & Witherspoon, J. 7952a, *rostulata* (MO).
Mori, S. et al. 3911, *corona* (NY); 6449, *rostulata* (BM, MO); 7527, *pteropodon* (MO).
Morton, C.V. 7348, *microphylla* (US).
Muenscher, W.C. 12456, *microphylla* (F, GH).
Nee, M. 10452, *quadrata* (US); 10477, *forgeti* (MO); 27626, *pubescens* (MO).
Nee, M. & Hansen, B.F. 185454, aff. *acuminata* (F); 18549, *pubescens* (F); 18725, *acuminata* (F, GH).
Nee, M. & Taylor, K. 26869, aff. *fasciata* (BM).
Neill, D. 2800, *microphylla* (MO); 3730, *hyalina* (BM, MO); 3758, *glabra* (BM); 4297, *glabra* (BM, MO).
Nelson, C. 2162, *hyalina* (MO).
Nelson, C. & Romero, E. 4712, *pubescens* (MO).
Nelson, C. & Vargas, E. 2283, *hyalina* (MO).
Nelson, C. et al. 3534, *parietaria* (MO).
de Nevers, G. 4053, *purulensis* (MO); 5243, *centradenoides* (BM).
de Nevers, G. et al. 5515, aff. *purulensis* (MO).
Nevling, L.I. & Gomez-Pompa, A. 116, *irrorata* (F); 2468, *irrorata* (F, GH).
Nichols, C.E. 1498, *microphylla* (BM, GH).
O'Kane & Salinas 3501, *microphylla* (BM).
Oersted, A.S. 1560, *acuminata* (K); 1860, *acuminata* (K); 14240, *herniarioides* (C); 14251, *microphylla* (C); 21730, *auriculata* (GH, NY); s.n., *auriculata* (C); s.n. 'Aguacate', *microphylla* (C).
Opler, P. 805, *pteropodon* (F, MO).
Orcutt, C. 3352, *microphylla* (BM, F).
Orozco, A. 197, *parietaria* (F); 249, *hyalina* (F); 253, *microphylla* (F); 275, *parietaria* (F); 281, *herniarioides* (F).
Ortega, R. 360, *microphylla* (BM).
Ortiz, R.T. 1632, *killipiana* (BM, F).
Palmer, E. 362, *microphylla* (BM).
Pavón, J.A. s.n., *dauciodora* (FI-W).
Peck, M.E. 555, *microphylla* (GH); 559, *pubescens* (GH).
Pipoly, J.J. 3713, *hyalina* (MO); 4834, *hyalina* (MO).
Pittier, H. 328, *pubescens* (BM, NY); 329, *pansamalana* (GH); 3086, *herniarioides* (F); 3230, *conjugalis* (NY); 12693, *microphylla* (US); 14046, *parietaria* (GH); 14149- sheet 1080422, *pittieri* (US); 14149-sheet 577992, *pittieri* (US); 16032, *fasciata* (BM, GH).
Pittier, H. & Tonduz, A. 2384, *parietaria* (P).
Pocasangre 11, *microphylla* (ITIC).
Poeppig, E.F. s.n. 'Dec. 1829', *hyalina* (C).
Polakowsky, H. 150, *vulcanica* (BM).
Porter, D.M. et al. 4419, *centradenoides* (MO); 4446, *centradenoides* (GH, MO); 4462, *centradenoides* (GH, MO); 4463, *centradenoides* (MO); 4630, *centradenoides* (MO); 4646, *centradenoides* (MO).
Pringle, C.G. 3550, *glabra* (GH, K); 8152, *acuminata* (GH, P).
Proctor, G.R. 25056, *quercifolia* (LL); 25072, *senarifolia* (LL); 25228, *quercifolia* (LL); 25244, *pubescens* (LL); 25255, *pubescens* (LL); 25256, *parietaria* (LL); 25361, *parietaria* (LL); 25425, *senarifolia* (LL); 25452, *glabra* (LL); 25488, *dauciodora* (LL); 25516, *microphylla* (LL); 31810, *microphylla* (LL); 31848, *pubescens* (LL); 32144, *ecboliophylla* (LL); 32395, *auriculata* (LL); 32431, *conjugalis* (LL); 32439, *pittieri* (LL); 32440, *purulensis* (LL); 32441, *costaricensis* (LL).
Purpus, C.A. 7470, *irrorata* (MO, NY, US); 7479, *irrorata* (GH); 7532, aff. *centradenoides* (GH).
Quiros, C.M. 464, *nummulariifolia* (F).
Ramamoorthy, T.P. 4359, *microphylla* (BM).
Raven, P.H. 20861, *pallida* (MO); 21544, *pallida* (F, MO); 21545, *pallida* (F, MO); 22004, *hyalina* (F).
Raven, P.H. & Breedlove, D.E. 19813, *microphylla* (F).
Renderos, M. 209, *involucrata* (B, LAGU, MO); 238, *acuminata* (B, LAGU, MO).
Robertson, J. 14(2), *microphylla* (BM).
Reyes, J.R. 363, *pubescens* (MO).
Reyes G., A. 1634, *mexicana* (BM).
Reyes G., A. et al. 1620, *microphylla* (BM).
Rios, D.E. 275, *hyalina* (MO).
Rivera, G. 1, *vulcanica* (BM); 239, *vulcanica* (BM); 322, *auriculata* (BM).
Robles, R. 2114, *ecboliophylla* (BM).
Robleto, W. 558, *microphylla* (MO); 994, *pubescens* (BM, MO); 1366, *hyalina* (BM, MO); 1934A, *pubescens* (MO).
Rodriguez, J.V. 2816, *nummulariifolia* (F); 2907, *glabra* (F).
Roe, K.E. et al. 729, *pubescens* (F); 1065, *microphylla* (F).
Rojas 136, *hyalina* (MO, NY); 207, *ecboliophylla* (BM).
Rosas R.M. 349, cf. *glabra* (A, BM); 508, *microphylla* (BM); 628, *microphylla* (BM); 21200, *acuminata* (F).
Rossbach, G. 3384, *microphylla* (GH); 3385, *microphylla* (GH); 3576, *pubescens* (GH); 3756, *pubescens* (GH); 3808, *microphylla* (GH); 3819, *imparifolia* (GH); 3878, *imparifolia* (GH).
Rovirosa, J.N. 326, *microphylla* (NY); 938, *chiapensis* (PH).
Rowlee, W.W. & Rowlee 376, *pallida* (US).
Salas 1423, *nummulariifolia* (F).
Sanchez et al. 437, *quercifolia* (BM).
Sandino, J.C. 2729, *microphylla* (BM, MO); 3470, *pubescens* (MO).
Sandoval, E. & Chinchilla 671, *microphylla* (MO); 673, *herniarioides* (B, LAGU, MO).
Sandoval, E. & Sandoval 848, *microphylla* (B, LAGU, MO).
Santiz C. 15, *microphylla* (TEX); 366, *microphylla* (TEX); 615, *glabra* (TEX); 616, *microphylla* (TEX); 758, *microphylla* (TEX).
Santiz R. 229, *dauciodora* (TEX).
Schaffner, J.G. 294, *microphylla* (C).
Schipp, W.A. 518, *pubescens* (BM, F, NY); 977, *microphylla* (BM, F, GH, NY); 1092, *microphylla* (BM, F, MO, NY); 8-702, *chiapensis* (F).
Schlim, L.J. 701, *latifolia* (P).
Schnell, R.A.A. 83, *pittieri* (F).
Schubert, B. & Rogerson 829, *glabra* (GH).
Schwabe, W. & Kailing, W. s.n., *microphylla* (MEXU).
Seemann, B.C. 561, *centradenoides* (BM); 1099, *centradenoides* (BM, F, MO).
Seibert, R.J. 293, *vulcanica* (GH).
Seiler, R. 766, *vulcanica* (F); 768, *dauciodora* (F).
Serre s.n., *hyalina* (P).
Sessé, M. et al. 4525, *killipiana* (F); 4526, *killipiana* (F); 4540, *pubescens* (F); 4541, *pubescens* (F); 4542, *nummulariifolia* (F); 4543, *parietaria* (F); 4546, *parietaria* (F); 4551, *parietaria* (F).
Seymour, F.C. s.n., *microphylla* (BM); 1332, *microphylla* (BM, F, MO); 1499, *microphylla* (MO); 2124, *hyalina* (MO); 3479, *hyalina* (MO); 5215, *microphylla* (MO); 5299, *microphylla* (MO).
Shank, P.J. & Molina A., R. 4244, *ecboliophylla* (US); 4998, *ecboliophylla* (US).

Shattuck, O.E. 196, *microphylla* (F, MO); 1078, *microphylla* (F).
Short, M. & Stafford, P. 39, *pansamalana* (BM); 145, *glabra* (BM).
Skutch, A.F. 559, *quercifolia* (GH, US); 944, *skutchii* (GH, US); 974, *skutchii* (GH, US); 1354, *irrorata* (GH, US); 1771, *glabra* (GH); 1793, *microphylla* (GH, US); 2311, *pubescens* (GH, MO, NY); 3143, *parietaria* (GH, MO, NY, US); 3186, *cornmanae* (GH, MO, NY, US); 3592, *pittieri* (GH, MO, NY, US); 3646, *parietaria* (GH, MO, NY, US); 3847, *hyalina* (GH, MO, NY, US).
Sloane, H. Vol. 2: 120, *parietaria* (BM-SL).
Smith, A. A443, *pittieri* (F, US); F1868, *imparifolia* (F, US); F1872, *pteropodon* (F); H17, *pubescens* (F); H74, *auriculata* (F); H75, *vulcanica* (F); H335, *auriculata* (F); H340, *angustifolia* (F); H400, *pittieri* (F); H425, *pittieri* (F); H492, *pteropodon* (F); H551, *pittieri* (F); H565, *parietaria* (F); H990, *ecboliophylla* (F, MO); NY558, *parietaria* (NY); NY717, *pittieri* (F, NY); NY718, *pittieri* (NY); NY776, *angustifolia* (NY); NY990, *ecboliophylla* (F, GH, NY); NY1062, *parietaria* (F, NY); NY1540, *parietaria* (NY); P2275, *parietaria* (GH, US); P2611, *ecboliophylla* (F); P2669, *pteropodon* (F); PC150, *angustifolia* (US); PC328, *pittieri* (F).
Smith & Smith 865, *involucrata* (K).
Sousa, M. 2651, *irrorata* (F).
Spellman, D.L. 1359, *microphylla* (MO).
Spellman, D.L. & Newey, W.W. 1689, *microphylla* (MO).
Spruce, R. s.n., *dauciodora* (K); 745, *dauciodora* (K); 4434, *imparifolia* (BM); 6047, *dauciodora* (K).
Standley, P.C. 306, *hyalina* (F); 8640, *microphylla* (F); 8710, *hyalina* (F); 9800, *microphylla* (F); 9977, *pubescens* (F); 10708, *pubescens* (F); 10764, *pubescens* (F); 11261, *hyalina* (F); 11323, *microphylla* (F); 16186, *microphylla* (F); 16535, *hyalina* (F); 16652, *microphylla* (F); 16661, *nummulariifolia* (F); 17756a, *microphylla* (F); 18393, *pubescens* (F); 19504, *hyalina* (NY); 19627, *hyalina* (GH); 22206, *hyalina* (GH, NY); 22409, *microphylla* (MO); 22682, *hyalina* (GH); 23998, *microphylla* (F); 28555, *nummulariifolia* (F); 29153, *hyalina* (F); 32483, *parietaria* (US); 32879, *hyalina* (US); 33943, *pittieri* (US); 34355, cf. *costaricensis* (US); 37241, *pteropodon* (US); 37323, *pteropodon* (US); 37337, *pteropodon* (US); 37769, *acuminata* (US); 37791, *acuminata* (F); 37797, *costaricensis* (US); 37809, *pittieri* (US); 37899, *purulensis* (US); 38393, *auriculata* (US); 38541, *vulcanica* (US); 38697, *vulcanica* (US); 38819, *glabra* (US); 38822, *parietaria* (US); 39204, *pittieri* (US); 39234, *vulcanica* (BM, US); 39454, *vulcanica* (US); 41191, *nummulariifolia* (F); 42180, *vulcanica* (C); 42546, *hyalina* (US); 42633, *vulcanica* (US); 42710, *vulcanica* (US); 42816, *vulcanica* (NY); 43084, *vulcanica* (C); 43102, *vulcanica* (GH); 53101, *microphylla* (F, US); 53406, *microphylla* (F); 53925, *hyalina* (F); 57774, *dauciodora* (US); 58014, *hyalina* (F); 58788, *dauciodora* (F, US); 60199, *irrorata* (F); 61929, *dauciodora* (F); 62231, *irrorata* (F); 66554, *microphylla* (F); 66890, *irrorata* (F, US); 67031, *pubescens* (F); 68147, *skutchii* (F, US); 68491, *auriculata* (F); 68548, *skutchii* (F); 68693, *irrorata* (F); 68723, *irrorata* (F); 68830, *microphylla* (F); 69120, *microphylla* (F); 69206, *pubescens* (F); 69866, *microphylla* (F); 70001, *pubescens* (F); 70353, *glabra* (F); 70424, *glabra* (F); 70852, *pubescens* (F); 71079, *purulensis* (F); 71092, *pansamalana* (F); 71245, *pansamalana* (F); 71250, *pansamalana* (F); 71253, *pubescens* (F); 71287, *pansamalana* (F); 71374, *pansamalana* (F); 71665, *pansamalana* (F); 76215, *microphylla* (F); 76216, *microphylla* (F); 76641, *microphylla* (F); 76725, *hyalina* (F); 76827, *microphylla* (F); 76915, *microphylla* (F); 77177, *hyalina* (F); 77877, *hyalina* (F); 77973, *microphylla* (F); 78332, *nummulariifolia* (F); 84606, *irrorata* (F); 84857, *skutchii* (F); 84920, *dauciodora* (F); 84931, *skutchii* (F); 85405, *dauciodora* (F); 85470, *dauciodora* (F); 85569, *skutchii* (F, US); 86491, *auriculata* (F); 87172, *irrorata* (F, US); 87187, *pubescens* (F); 88246, *hyalina* (F); 88533, *microphylla* (F); 88713, *hyalina* (F); 89277, *irrorata* (F); 89785, *pansamalana* (F); 89797, *pansamalana* (F); 90487, *pansamalana* (F); 90669, *pubescens* (F, LL); 90727, *pansamalana* (F, US); 90771, *pansamalana* (F); 91394, *pansamalana* (F, US); 91506, *pansamalana* (F); 91718, *riparia* (F); 91768, *microphylla* (F); 92191, *pansamalana* (F).
Standley, P.C. & Chacón, P. 5661, *microphylla* (F); 7168, *hyalina* (F); 7203, *nummulariifolia* (F).
Standley, P.C. & Padilla B. 2766, *hyalina* (F); 3530, *microphylla* (F).
Standley, P.C. & Torres R., R. 47591, *vulcanica* (GH); 51366, *vulcanica* (US).
Standley, P.C. & Valerio J. 43765, cf. *auriculata* (GH); 44753, *tilarana* (US); 45106, *pubescens* (GH); 45398, *imparifolia* (US); 45409, *ecboliophylla* (US); 49014, cf. *costaricensis* (US); 49676, *pittieri* (GH); 49715, *vulcanica* (BM); 49815, *pittieri* (US); 49943, *vulcanica* (US); 50296, *pteropodon* (US); 51947, *pittieri* (US); 52023, *pittieri* (US); 52192, *vulcanica* (US).
Steggerda, M. 8, *microphylla* (F); 1936, *microphylla* (F).
Stern, W.L. et al. 541, *pubescens* (US); 2006, *parietaria* (US).
Stevens, W.D. 13580, *pittieri* (BM, MO); 13918, *cornmanae* (MO); 13929, *conjugalis* (BM, F, MO); 14001, *auriculata* (MO); 18167, *vulcanica* (BM, MO); 18209, *auriculata* (BM); 18340, *purulensis* (MO); 18417, *pubescens* (BM, MO); 21811, *hyalina* (BM); 22981, *hyalina* (BM).
Stevens, W.D. & Krukoff, B. 2972, *microphylla* (MO); 3247, *hyalina* (MO); 3514, *hyalina* (BM, MO); 4003, *hyalina* (BM, MO); 4085, *hyalina* (MO); 4230, *microphylla* (BM, MO); 4352, *hyalina* (BM, MO); 4426, *microphylla* (BM); 7288, *microphylla* (MO); 7401, *microphylla* (BM, MO); 8714, *hyalina* (MO); 8731, *microphylla* (BM, MO); 9180, *pubescens* (BM, MO); 9274, *pubescens* (BM, MO); 9605, *pubescens* (BM, MO); 10095, *microphylla* (MO); 10757, *hyalina* (MO); 10937, *microphylla* (MO); 11355, *pubescens* (BM, MO); 11667, *parietaria* (MO); 11822, *microphylla* (MO); 11849, *hyalina* (BM, MO); 15595, *hyalina* (BM); 16830, *microphylla* (MO); 17653, *hyalina* (BM, MO).
Stevens, W.D. & Martinez S., E. 25725, *microphylla* (MO).
Stevens, W.D. et al. 14435, *microphylla* (MO); 14517, *hyalina* (BM, MO); 14883, *microphylla* (BM, MO); 15309, *glabra* (BM, MO); 15726, *hyalina* (BM, MO); 15777, *microphylla* (BM, MO); 15984, *microphylla* (BM, MO); 16086a, *hyalina* (MO); 16721, *hyalina* (MO); 18088, *glabra* (BM, MO); 18567, *pubescens* (BM, MO); 20214, *microphylla* (BM, MO); 20321, *glabra* (BM); 20337, *pubescens* (BM); 20385, *pubescens* (BM, MO); 20896, *pubescens* (BM, MO); 21163a, *pubescens* (MO); 21362, *glabra* (BM, TEX); 21364, *hyalina* (MO); 25064, *fasciata* (BM); 25491, *irrorata* (BM).
Stewart 9, *microphylla* (GH).
Steyermark, J.A. 29410, *microphylla* (F); 30017, *vulcanica* (F); 30019, *auriculata* (F); 31706, *pubescens* (F); 32647, *dauciodora* (F); 33470, *skutchii* (F); 33897, *irrorata* (F, US); 34276, *dauciodora* (F); 35371, *microphylla* (F, US); 35727, *dauciodora* (F, US); 36349, *auriculata* (F); 36406, *skutchii* (F); 37227, *irrorata* (F, US); 37327, *auriculata* (F); 37482, *mexicana* (F); 37496, *irrorata* (F); 37521, *quercifolia* (F); 37693, *auriculata* (F); 39517, *chiapensis* (F, US); 39854, *irrorata* (NY); 39926, *microphylla* (F); 41826, aff. *glabra* (F); 41994, *ecboliophylla* (F, US); 42450, *microphylla* (F); 43646, *purulensis* (F); 43650, *auriculata* (F); 43782, *mexicana* (F); 43923, *pubescens* (F); 44093, *pubescens* (F); 44106, *glabra* (F); 44199, *pansamalana* (F, NY); 44555, *pubescens* (F); 44700, *killipiana* (F, NY, US); 44720, cf. *costaricensis* (F); 44751, *pleuroneura* (F, NY, US); 44756, *irrorata* (F); 44757, *killipiana* (F); 44760, *microphylla* (F); 45408, *pubescens* (F, NY, US); 45814, *microphylla* (F); 45823, *pubescens* (F, LL, US); 46818, *pubescens* (F, US); 47385, *skutchii* (F); 48493, *dauciodora* (F, US); 48540, *glabra* (F); 48604, *pansamalana* (F, US); 48623, *pansamalana* (F, US); 48842, *pansamalana* (F); 49098, *dauciodora* (F); 49165, *pubescens* (F, NY); 49318, *irrorata* (F, NY); 49521, *glabra* (F); 49638, *glabra* (F); 49642, aff. *auriculata* (F); 49783, *dauciodora* (F, US); 49873, *mexicana* (F); 50033, *quercifolia* (F); 50446, *microphylla* (F); 50653, *dauciodora* (F, NY); 51728, *pansamalana* (F, NY).
Steyermark, J.A. & Allen, P.H. 17252, *pteropodon* (MO).
Stork, H.E. 1642, *auriculata* (F); 1806, *vulcanica* (F).
Sullivan, G.A. 350, purulensis (MO); 486, *imparifolia* (MO, NY).
Swartz, O. s.n., *herniarioides* (BM, S); s.n., *nummulariifolia* (BM).
Sytsma, K. 3746, *centradenoides* (BM); 4072, *centradenoides* (BM); 4080, aff. *digitata* (MO).
Sytsma, K. & Anderson, L. 4445, *forgeti* (BM); 4495, *magnicarpa* (MO); 4720, *purulensis* (MO).
Sytsma, K. & Antonio, T. 3059, *tutensis* (LL, MO).
Sytsma, K. & Stevens, W.D. 2176, *vulcanica* (LL, MO).
Sytsma, K. et al. 4211, *daguensis* (BM); 4386, *daguensis* (MO); 4993, *vulcanica* (BM, MO).
Taylor, J. 17686, *auriculata* (NY).
Taylor, R.J. 4601, *vulcanica* (NY).
Téllez, O.V. 12481, *microphylla* (BM).
Téllez, O.V. et al. 7832, *hyalina* (MO).
Tenorio L., P. 5607, *mexicana* (MEXU); 14645, *pubescens* (BM).

Terry, M.E. 1341, *auriculata* (F, GH).
Terry, M.E. & Terry, R.A. 1440, *forgeti* (F, GH); 1512, *daguensis* (F, GH, MO); 1516, *centradenoides* (F, GH); 1520, *centradenoides* (F, GH, MO); 1556, *pteropodon* (F, GH, MO); 1563a, *digitata* (F, GH, MO); 1617, *imparifolia* (F, GH).
Thieme, C. 5493, *hyalina* (GH).
Thorne, R.F. & Lathrop, E. 40369, *pansamalana* (LL); 40371, *mexicana* (LL); 40389A, *irrorata* (LL).
Ton, A.S. 1203, cf. *dauciodora* (LL); 2503, *pubescens* (LL); 2803, *mexicana* (F); 2878, *irrorata* (F, LL); 2938, *herniarioides* (NY); 4176, *glabra* (MEXU); 7731, *pansamalana* (BM); 8173, *pansamalana* (BM).
Ton, A.S. et al. 9238, *glabra* (TEX).
Tonduz, A. 1402, *hyalina* (BM, P); 1942, *auriculata* (US); 2086, *auriculata* (BM); 7179, *hyalina* (F, GH); 7467, *costaricensis* (GH); 8854, *pubescens* (BM, GH, P); 9252, *pteropodon* (US); 11805, *vulcanica* (NY); 11925, *vulcanica* (NY).
Toriz, A., G. & Campos V. 924, *pubescens* (BM).
Torres, C., R. & Cedillo, T.R. 705, *dauciodora* (BM).
Torres, C., R. & Hernández, H. 6487, *microphylla* (BM).
Torres, C., R. & Martinez 7498, *dauciodora* (BM).
Torres, C., R.C. et al. 3998, *dauciodora* (BM).
Transito 5, *microphylla* (ITIC).
Triana, J. 887, *centradenoides* (BM, NY, P); 888, *centradenoides* (BM, P); 889, *daguensis* (BM, P); s.n., *fasciata* (BM, P); s.n., *lindeniana* (K); s.n., *pteropodon* (BM, P).
Triana, J. & Linden, J.J. 236, *lindeniana* (K).
Tróchez, L. 36, *glabra* (MEXU, MO).
Tucker, J.M. 714, *hyalina* (F); 715, *hyalina* (GH, LL, NY, US).
Tuerckheim, H. von s.n., *pleuroneura* (NY); 753, *pubescens* (NY, P); 754, *pleuroneura* (GH, NY, P); 939, *pansamalana* (GH, NY, P); 974, *pubescens* (P); 1040, *riparia* (GH, NY, P); 1264, *pubescens* (BM, F, GH, MO, NY, P); 1270, *parietaria* (F, P); 1296, *pansamalana* (F, GH, MO, NY); 1312, *microphylla* (F, NY); 1707, *purulensis* (BM, C, F, GH, NY); 1708, *riparia* (GH, NY); 1835, *glabra* (NY); 1980, *dauciodora* (BM, F, GH, MO, US); 2011, *tridentata* (C, F, GH, MO, NY); 7983, *ecboliophylla* (GH, MO, NY, US); 8568, *hyalina* (F, GH, NY); 8754, *pubescens* (GH).
Tyson, E.L. 5209, *microphylla* (MEXU).
Tyson, E.L. & Blum, K.E. 3948, *forgeti* (MO).
Tyson, E.L. & Loftin, H. 6304, *microphylla* (MEXU).
Utley, J. & Utley, K. 1101, *pallida* (F); 1335, *parietaria* (F); 2378, *angustifolia* (NY); 2905, *costaricensis* (F); 3403, *purulensis* (LL); 3599, *auriculata* (F); 4833, cf. *costaricensis* (F); 5015, *purulensis* (F, MO); 5103; *pittieri* (F).
Valerio R. 212, *microphylla* (F); 277, *hyalina* (F); 444, *imparifolia* (F); 716, *glabra* (F); 1165, *auriculata* (F); 1244, *pteropodon* (F); 1291, *nummulariifolia* (F); 1373, *pteropodon* (F); 1406, *pittieri* (F); 1406a, *parietaria* (F); 1556, *pteropodon* (F); 1661, *costaricensis* (F); 3072, *microphylla* (F); 3608, *microphylla* (F).
Vazquez T. 463, *pubescens* (F).
Ventura A., F. 1275, *microphylla* (F); 2372, *microphylla* (F); 20593, *pubescens* (MEXU).
Villacorta, R. 94, *microphylla* (LAGU); 96, *involucrata* (LAGU); 97, *microphylla* (LAGU); 115, *acuminata* (LAGU); 1026, *dauciodora* (LAGU, MO).
Villacorta, R. & Lemus 442, *hyalina* (BM, MO).
Vincelli, P. 372, *glabra* (BM, MO); 389, *pubescens* (BM, MO).
Weberling 1310, *herniarioides* (ITIC).
Webster, G.L. 12189, *parietaria* (F).
Webster, G.L. et al. 11730, *dauciodora* (MEXU, MO); 17785, cf. *mexicana* (MEXU); 20241, cf. *purulensis* (GH).
Wedel, H. von 2203, *pteropodon* (US); 2487, *microphylla* (GH); 2847, *microphylla* (US).
Weddell, H.A. 4561, *dauciodora* (P).
Wendt, T. et al. 2538, aff. *pteridophylla* (BM); 3088, *tridentata* (BM); 3912, aff. *pteridophylla* (BM); 3919, *irrorata* (BM); 3983, *irrorata* (BM); 4169, *tridentata* (BM); 4877, aff. *pteridophylla* (BM); 4923, *mexicana* (BM); 4992, *microphylla* (BM); 4997, *glabra* (BM); 5421, *glabra* (BM); 5576, *mexicana* (BM).
Werff, H. van der & Hardeveld, C. van 6575, *purulensis* (BM); 6721, *digitata* (MO); 6798, *digitata* (MO).
Werff, H. van der & Herrera 6286, *auriculata* (BM); 6397, *vulcanica* (BM).
Weston, A.S. 1512, *pteropodon* (F); 5066, *pteropodon* (F).
Weston, A.S. et al. 3449, *parietaria* (MO).
White, P. 173, *vulcanica* (MO); 228, cf. *auriculata* (GH).
Whitefoord, C. 1136, *pubescens* (BM); 1597, *microphylla* (BM); 1786, *chiapensis* (BM); 1857, *pubescens* (BM); 3216, *pubescens* (BM); 3266, *pubescens* (BM); 3297, *pubescens* (BM); 9450; *microphylla* (BM); 32997, *pubescens* (F).
Whitefoord, C. & Eddy, A. 426, *forgeti* (BM); 437, *forgeti* (BM); 496, *pteropodon* (BM).
Whittemore 82-049, *purulensis* (TEX).
Wilbur, R. et al. 11882, *vulcanica* (F, GH); 13527, *purulensis* (F, GH, NY); 22864, *dauciodora* (F).
Wiley, J.R. 522a, *microphylla* (MO); 552, *microphylla* (MO).
Williams, L.O. 810, *forgeti* (F, NY); 837, *pubescens* (NY); 16396, *auriculata* (F); 16461, *acuminata* (F); 16863, *microphylla* (BM, F, GH); 17253, *parietaria* (F, GH).
Williams, L.O. & Allen 16523, cf. *costaricensis* (F, GH).
Williams, L.O. & Molina R., A. 400, *hyalina* (F); 8663, *parietaria* (NY); 10406, *microphylla* (F, MO); 10664, *microphylla* (BM, F); 11443, *hyalina* (F, GH, MEXU); 14479, *pubescens* (GH).
Williams, L.O. & Williams 18589, *dauciodora* (F, US).
Williams, L.O. et al. 23078, *dauciodora* (F); 23644, *pubescens* (NY); 24359, *pittieri* (F); 24400, *dauciodora* (F); 24664, *pubescens* (F); 25758, *auriculata* (GH, NY); 25770, *dauciodora* (F, NY); 25792, *auriculata* (F); 25794, *dauciodora* (F); 25954, *skutchii* (F, MO); 26102, *skutchii* (F); 26211, *auriculata* (BM, F); 26582, *hyalina* (F); 26776, *skutchii* (F); 26955, *hyalina* (F, GH, NY, US); 27492, *hyalina* (F); 27985, *hyalina* (F, NY, US); 28025, *auriculata* (F, NY); 28047, *parietaria* (NY, US); 28342, *hyalina* (F, NY, US); 28979, *pubescens* (F, NY); 40199, *microphylla* (F); 40410, *pubescens* (F); 41999, *microphylla* (F); 42013, *microphylla* (F); 43234, *microphylla* (F); 43624, *microphylla* (F).
Wilson, P. 40787, *pubescens* (F); 40941, *quercifolia* (F).
Witherspoon, J.T. et al. 8860, *tutensis* (MO, NY).
Woodson, E.E. Jr. & Schery, R. 242, *parietaria* (GH, MO, US); 243, *vulcanica* (GH, MO, US); 269, *vulcanica* (GH, MO); 346, *auriculata* (US); 347, *vulcanica* (MO); 449, cf. *gracilipes* (GH); 668, *purulensis* (GH).
Woodson, E.E. Jr. et al. 894, *vulcanica* (GH, NY); 934, *auriculata* (MO, NY, US); 1600, *involucrata* (GH, NY, US).
Wright, C. 1458, *herniarioides* (BM, K, MO, P).
Young s.n., *pittieri* (F).
Yuncker, T.G. et al. 8486, *pubescens* (BM, F, MO, NY).

SYSTEMATIC INDEX

Accepted names are in roman and synonyms in *italics*.

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The Japanese plant collection of Engelbert Kaempfer (1651–1716) in the Sir Hans Sloane Herbarium at The Natural History Museum, London

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SYNOPSIS. The German physician Engelbert Kaempfer (1651–1716) was one of the first Europeans to be employed by the Dutch East India Company as a company surgeon at Nagasaki in Japan. His two-year stay (1691–1692) afforded him an opportunity to study the Japanese flora and he collected more than four hundred specimens, which are now preserved as volume HS 211 of the Sloane Herbarium at The Natural History Museum in London. As a further result of his botanical studies he published the descriptions of about five hundred Japanese plants in his work '*Amoenitatum exoticarum* [...], *fasc. V*' in 1712 and made more than two hundred, mostly unpublished, drawings of Japanese plants. Kaempfer's plant collection is historically very important as a first European record of the Japanese flora and it is an essential element for the understanding of his botanical work in Japan. The collection has now been thoroughly studied and a database of his specimens in volume HS 211 has been created as part of an ongoing project to digitize historical collections at The Natural History Museum. A provisional identification catalogue of all the specimens in HS 211 is provided here and the complete database will be available on the NHM web site in the near future.

INTRODUCTION

Engelbert Kaempfer was born 15 September 1651 in Lemgo, Germany. After his university studies of law and medicine in Poland and Sweden he travelled in 1683 to Russia and Persia (now Iran), where he stayed until 1688. The Persian plant specimens in volume HS 211 (fol. 107–fol. 109) of the Sloane Herbarium were probably collected during this period.

Kaempfer arrived in Japan on 26 September 1691 by way of India, Ceylon (now Sri Lanka), and Java. He had been offered employment by the Dutch East India Company as a company surgeon and stayed until 31 October 1692. During the Edo period Japan was closed to foreigners, but employees of the Dutch East India Company were allowed to stay in Deshima, a trading post situated on an artificial island in Nagasaki Harbour. Although normally he would have been obliged to remain in Deshima, as a company surgeon Kaempfer twice had the opportunity to accompany the shogun to Edo, the Tokyo of today.

Geographical, topographical, and cultural observations were strictly prohibited, but Kaempfer's botanical interest was supported by the Japanese. He collected specimens, prepared drawings, and took copious notes on the Japanese flora. Fortunately when he left Japan, he succeeded in taking his plant collection, as well as his manuscripts, back to Europe.

Travelling via Java and South Africa on his journey to Europe, he arrived one year later in Leyden (Leiden, The Netherlands), where he finally wrote his thesis in medicine. It is possible that Kaempfer's collection of European plants, arranged as a study herbarium, may have been prepared during his stay at the University of Leiden. This collection is kept in volume HS 213 of the Sloane Herbarium at The Natural History Museum, London.

Engelbert Kaempfer passed his last years in his home town of Lemgo as a physician, while also working on his manuscripts. For a detailed appreciation of Engelbert Kaempfer's life and work, see Haberland (1996).

KAEMPFER'S PUBLICATIONS AND MANUSCRIPTS ON THE JAPANESE FLORA

Together with his plant collection, Engelbert Kaempfer left behind an extensive collection of manuscripts, drawings, and objects from his travels. After his death, Sir Hans Sloane became interested in these manuscripts and collections and acquired them from Kaempfer's nephew (Dandy, 1958: 145).

Today, Kaempfer's manuscripts are housed at the British Library, Department of Manuscripts, and his plant collections are kept at The Natural History Museum, London as part of the Sloane Herbarium

(HS 211 and HS 213). Several of his extensive manuscripts (for example, Sl 74, Sl 2907, Sl 2914, and Sl 2915) concern Japanese botany, one being of particular interest, namely his drawings of Japanese plants (Sl 2914). This volume, entitled '*Delineatio plantarum japonicarum*' contains 217 folios, mostly with Japanese plant names and references to Kaempfer's publication '*Amoenitatum exoticarum* [...], *fasc. V*' (1712) by J.G. Scheuchzer (Dandy, 1958: 145). Fifty of these detailed drawings were selected and published posthumously by Banks (1791).

Clearly Kaempfer's most important work on the Japanese flora is his publication of over five hundred plant descriptions in '*Amoenitatum exoticarum* [...], *fasc. V*' (1712), where he provided the Chinese characters, the Latin transcriptions of the Japanese plant names, and fairly detailed Latin descriptions. For an annotated reprint of Kaempfer's flora of Japan, see Muntschick (1983). In his descriptions of Japanese plants Kaempfer frequently referred to European species. He is believed to have used his collection of European specimens collected in Leiden, The Netherlands (HS 213: '*Plants gathered in the gardens of Leyden by Dr. Engelbert Kaempfer*') for these comparisons.

An extensive historical-critical edition of Kaempfer's flora of Japan has been in preparation since 1992 at the Institut für Geschichte der Naturwissenschaften at the Ludwig-Maximilians-Universität, Munich (Germany) by Professor Brigitte Hoppe, the author of this paper being responsible for all botanical comments.

KAEMPFER'S COLLECTION OF JAPANESE PLANTS

The volume of Englebert Kaempfer's Japanese plant collection (HS 211) is one of the most important in the Sloane Herbarium as his records are basic to the study of the flora of Japan (Dandy, 1958: 144–145). The volume contains 410 specimens on 111 folio sheets (Fig. 1). It is entitled '*Volumen plantarum in Japonia collectarum ab Engelberto Kempfero M. D. annis 1691 & 1692. Addita sub finem plantae aliquot ab eodem in Persia & Insula Ceylan repertae*' by M. Maty (1718–1776), Principal Librarian at the British Museum in 1757. The specimens of each folio have been numbered by a previous revisor, probably D.C. Solander.

Several species are represented by a number of specimens on different sheets of the herbarium; for example, *Amelanchier asiatica* (Siebold & Zucc.) Endl. (HS 211: 11. 2, 37. 5, 39. 1, 74. 4, 77. 8, 89. 1, ?90. 1). All specimens are Japanese plants, except those on fol. 107–fol. 109 from Persia (Iran) and those on fol. 110 from Ceylon (Sri Lanka). Many specimens are on small, probably original sheets affixed to larger ones of the Sloane volume (for example, fol. 24, fol. 26–fol. 36, fol. 108, and fol. 111). Several bear names in E. Kaempfer's hand. Some specimens have original labels written by E. Kaempfer which unfortunately are often illegible (for example, fol. 6, fol. 7, fol. 55, and fol. 69).

Table 1 Information recorded in the database of the Kaempfer herbarium.

Category of information	Description	Fields
Consecutive number	A running number used to distinguish each specimen or position of missing specimen in the volume.	Consecutive number
Position number (HS 211)	Folio number followed by a number indicating the specimen's position on the page, probably added by D.C. Solander.	Position number (HS 211)
Determination	Family, genus and, if possible, species with its authority. The identifications follow as far as possible the taxonomy of Ohwi, *Flora of Japan* (1965) and probably Zander (1994). Any uncertainty is indicated by a question-mark to the left of the identification.	Family, Genus, Species, Authority
Determinavit	The determiner.	Determinavit
Duplicates	Denotes species represented by a number of specimens on different folios of the herbarium.	Duplicates
Annotations	These are in chronological order. All of them are copied literally and their authors are identified if possible.	
Annotation 1	Shows if an original label written by E. Kaempfer is present.	Annotation 1
Annotation 2	Indicates references written by J.G. Scheuchzer to Kaempfer's manuscript of drawings (Sl 2914).	Annotation 2
Annotation 3	Indicates references written by J.G. Scheuchzer to Ray's (1686–1704) *Historia plantarum*.	Annotation 3
References to Ray's *Historia plantarum*	All references to Ray's *Historia plantarum* (1686–1704) are indicated and the original citation in the copy of the Botany Library atThe Natural History Museum is quoted. The author of these annotations seems to be J. Amman.	RAY, Hist. Pl. (text): RAY, Hist. Pl. (manu):
Locality	Indicates that the specimens come essentially from Japan with the exceptions quoted from Persia and Ceylon.	Locality
Correspondence to E. Kaempfer's other works	Reference to Kaempfer's (1712) publication, *Amoenitatum exoticarum* [...] *fasc. V* , (Am. Ex.) with the page number on which the species is described and secondly the number attributed to this plant description.	Am. Ex. (page): Am. Ex. (number):
Correspondence to drawings	Shows the correspondence of the herbarium specimen to an original drawing of Engelbert Kaempfer in his manuscripts (Sl 2914). These drawings are referred to by Roman numerals [Sl 2914 (page, Rom.):] and by Arabic numerals [Sl 2914 (page, Arab.):].	Sl 2914 (page, Rom.): Sl 2914 (page, Arab.):
Comments	Indicates any particularity of the specimen, for example its position on an original herbarium sheet or the legibility of Kaempfer's label. Relevant remarks on synonyms may also be here.	Comments

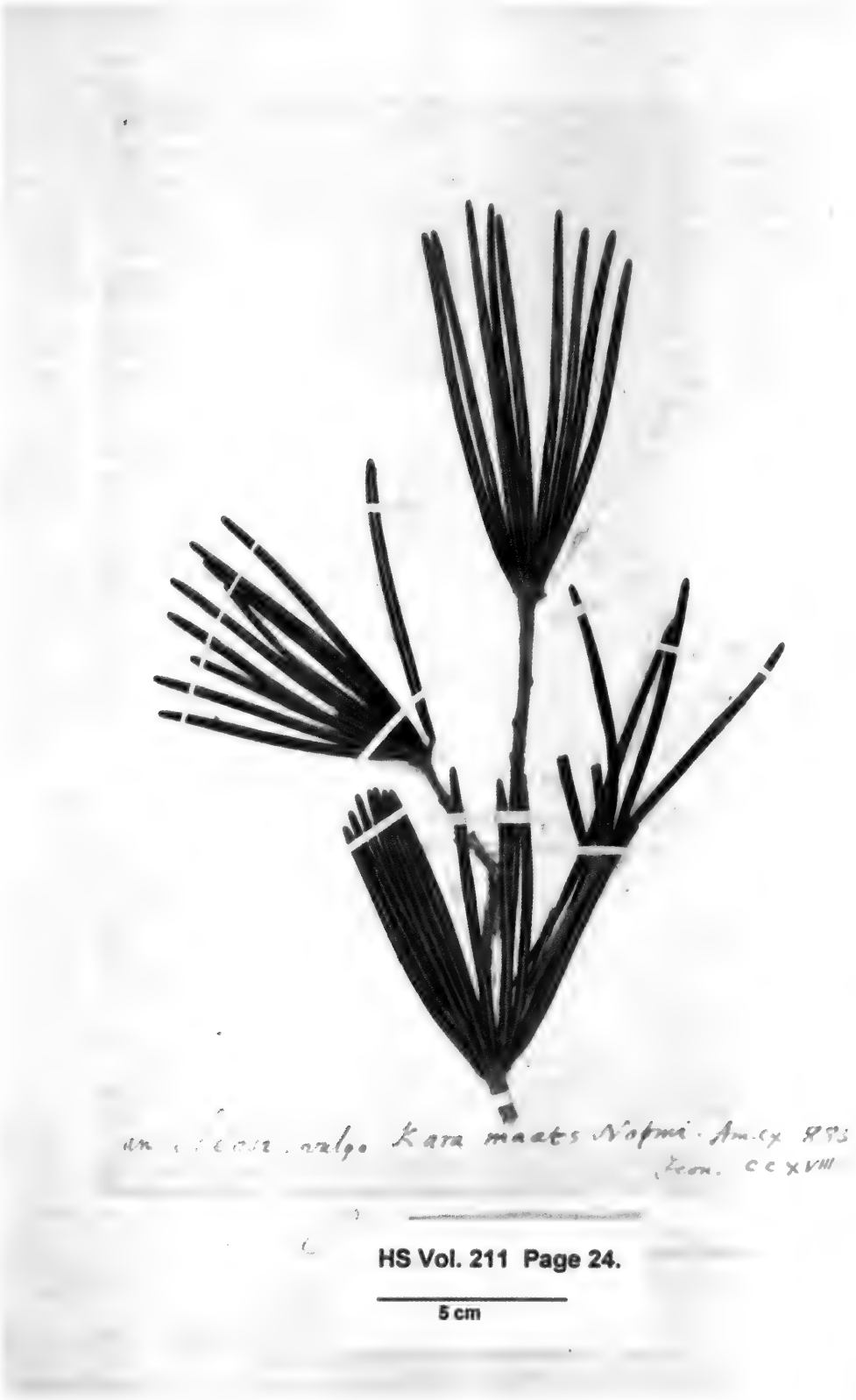

Fig. 1 *Sciadopitys verticillata* (Thunb.) Siebold & Zucc., *Taxodiaceae* (HS 211: 24. 0).

The first examiners of Engelbert Kaempfer's plant collection were J.G. Scheuchzer (1684–1738) and J. Amman (1707–1741). Many specimens are referred to Ray's, *Historia plantarum* (1686–1704) by J. Amman. J.G. Scheuchzer was Sir Hans Sloane's amanuensis and translated E. Kaempfer's '*The history of Japan*' from the High German manuscript into English, which was first published in London in 1727. Most of the specimens are named by D.C. Solander (1733–1782); from fol. 1 to fol. 44 each specimen is labelled individually; from fol. 45 onwards the identifications of all specimens on one folio are gathered on one label. Undetermined specimens have been annotated with the symbol '0' by Solander.

Some annotations indicate that C.P. Thunberg (1743–1828), who inspected Kaempfer's collection in 1778 (Dandy, 1958: 145), helped Solander to identify certain specimens. See, for example, HS 211: fol. 45. 1, where Solander wrote 'Thunberg not knew'. It is possible that some of the specimens in this volume (HS 211) were originally from Thunberg's collection of Japanese plants (for example, HS 211: fol. 3. 4, 40. 1). C.P. Thunberg had held the same position in Japan at the Dutch East India Company as Kaempfer and he published an extensive flora with reference to Kaempfer's descriptions (Kaempfer, 1712) with a separate identification catalogue of Kaempfer's descriptions called '*Kaempferus illustratus*' as an annex (Thunberg, 1784).

Particular specimens were later revised by several botanists, among the most important of which were R.A. Salisbury (1761–1829), Ph. F. von Siebold (1796–1866), and W. Munro (1818–1889).

At the beginning of the nineteenth century the Coniferae collected by Kaempfer were the subject of a paper by Salisbury (1817), who wrote his identification next to each specimen, while J. Britten indicated the reference to this paper.

Ph. F. von Siebold, who also had an opportunity to study the flora in Japan and had published a flora of the country (Siebold & Zuccarini, 1835–1870), studied Kaempfer's collection and annotated several specimens (for example, in HS 211: 25. 3, 48. 2, 50. 3, 58. 4, 59. 3).

In his monograph of the Bambusoideae, Munro (1870) referred to all Kaempfer specimens of this subfamily of Poaceae found in HS 211 (for example, fol. 78, fol. 98, and fol. 99).

Only a few specimens carry modern *determinavit* slips, for example all specimens of the genus *Rhododendron* L. examined by B. Miyazawa in 1926 and specimens of the genus *Magnolia* L. studied by J.E. Dandy.

Database of the Kaempfer herbarium

This database has been created to provide a searchable record of information on Kaempfer's specimens and associated sources and will include a series of digital images of each specimen in volume HS 211. It includes a current identification of each specimen as far as possible, as well as all previous annotations or determinations. The information recorded in the database and the fields included are summarized in Table 1.

Whilst there are a number of inconsistencies and omissions concerning determinations of the specimens and identification of the author's handwriting in the database, checking of data is continuing. It is hoped that the future publication of this database and images on the web site of The Natural History Museum [http://www.nhm.ac.uk/botany/databases] will encourage further annotation by specialists to complete the taxonomic identity of this historically and scientifically important herbarium.

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APPENDIX: PROVISIONAL IDENTIFICATION CATALOGUE OF SPECIMENS IN VOLUME HS 211 OF THE SIR HANS SLOANE HERBARIUM BM(S)

Note: The first number indicates the folio number of the volume, the second number following the full-stop indicates the position number of the specimen on the folio attributed by D.C. Solander. A question-mark to the left of an identification indicates an uncertain determination.

The pteridophytes have been identified by J. Camus and A.M. Paul and specimens of the genus *Rhododendron* L. by B. Miyazawa; other specimens have mostly been identified by P.-A. Hinz.

1. 1: ?*Cyathea fauriei* (H. Christ) Copel. (Cyatheaceae)
1. 2: Pteridophyta
2. 0: *Adiantum monochlamys* Eaton (Pteridaceae)
3. 1: *Polygonum chinense* L. (Polygonaceae)
3. 2: *Achyranthes japonica* (Miq.) Nakai (Amaranthaceae)
3. 3: *Lygodium japonicum* (Thunb.) Sw. (Schizaeaceae)
3. 4: *Asplenium incisum* Thunb. (Aspleniaceae)
4. 1: *Lunathyrium japonicum* (Thunb.) Sa. Kurata (Dryopteridaceae)
4. 2: *Ziziphus jujuba* Mill. (Rhamnaceae)
4. 3: Asteraceae
4. 4: *Sphenomeris chinensis* (L.) Maxon (Dennstaedtiaceae)
5. 1: *Rhus javanica* L. (Anacardiaceae)
5. 2: *Rhus verniciflua* Stokes (Anacardiaceae)
5. 3: *Phegopteris decursive-pinnata* (H.C. Hall) Fée (Thelypteridaceae)
6. 1: *Juniperus chinensis* L. (Cupressaceae)
6. 2: *Thuja orientalis* L. (Cupressaceae)
6. 3: *Chamaecyparis pisifera* (Siebold & Zucc.) Endl. (Cupressaceae)
6. 4: *Juniperus chinensis* L. (Cupressaceae)
7. 1: *Cryptomeria japonica* (L.f.) D. Don (Taxodiaceae)
7. 2: *Cryptomeria japonica* (L.f.) D. Don 'Elegans' (Taxodiaceae)
7. 3: *Thuja orientalis* L. (Cupressaceae)
8. 1: *Thujopsis dolabrata* (Thunb. ex L.f.) Siebold & Zucc. (Cupressaceae)
8. 2: *Pieris japonica* (Thunb.) D. Don (Ericaceae)
8. 3: *Rhododendron indicum* (L.) Sweet (Ericaceae)
9. 1: *Quercus dentata* Thunb. (Fagaceae)
9. 2: *Shortia soldanelloides* (Siebold & Zucc.) Makino (Diapensiaceae)

9. 3: *Abies firma* Siebold & Zucc. (Pinaceae)
9. 4a: *Stachyurus praecox* Siebold & Zucc. (Stachyuraceae)
9. 4b: *Forsythia suspensa* (Thunb.) Vahl (Oleaceae)
10. 1: *Cephalotaxus harringtonia* (Knight) K. Koch (Cephalotaxaceae)
10. 2: *Cryptomeria japonica* (L.f.) D. Don 'Elegans' (Taxodiaceae)
10. 3: *Juniperus rigida* Siebold & Zucc. (Cupressaceae)
10. 4: *Albizia julibrissin* Durazz. (Fabaceae)
10. 5: *Veronica linariifolia* Pall. (Scrophulariaceae)
11. 1: *Juniperus rigida* Siebold & Zucc. (Cupressaceae)
11. 2: *Amelanchier asiatica* (Siebold & Zucc.) Endl. (Rosaceae)
11. 3: *Chaenomeles japonica* (Thunb.) Lindl. (Rosaceae)
11. 4: *Aesculus turbinata* Blume (Hippocastanaceae)
12. 1: *Cryptomeria japonica* (L.f.) D. Don (Taxodiaceae)
12. 2: *Artemisia indica* Willd. (Asteraceae)
12. 3: *Juniperus rigida* Siebold & Zucc. (Cupressaceae)
13. 1: *Juniperus rigida* Siebold & Zucc. (Cupressaceae)
13. 2: *Juniperus rigida* Siebold & Zucc. (Cupressaceae)
13. 3: *Aucuba japonica* Thunb. (Cornaceae)
14. 1a: *Paulownia tomentosa* (Thunb.) Steud. (Scrophulariaceae)
14. 1b: *Kerria japonica* (L.) DC. (Rosaceae)
14. 2: *Juniperus rigida* Siebold & Zucc. (Cupressaceae)
15. 1: *Aphananthe aspera* (Thunb.) Planch. (Ulmaceae)
15. 2: *Spiraea prunifolia* Siebold & Zucc. (Rosaceae)
15. 3: *Selaginella pachystachys* Koidz. (Selaginellaceae)
15. 4: *Forsythia suspensa* (Thunb.) Vahl (Oleaceae)
16. 1: ?*Selaginella tamariscina* (P. Beauv.) Spring (Selaginellaceae)
16. 2: ?*Caesalpinia japonica* Siebold & Zucc. (Fabaceae)
16. 3: *Rubus commersonii* Poir. (Rosaceae)
17. 1: ?*Caesalpinia japonica* Siebold & Zucc. (Fabaceae)
17. 2: *Rhododendron japonicum* Sur. (Ericaceae)
17. 3: *Ranunculus* sp. (Ranunculaceae)
17. 4: *Ligustrum ibota* Siebold & Zucc. (Oleaceae)
18. 1: *Juniperus chinensis* L. (Cupressaceae)
18. 2: *Abelia spathulata* Siebold & Zucc. (Caprifoliaceae)
18. 3: *Trachelospermum* sp. (Apocynaceae)
18. 4: *Deutzia scabra* Thunb. (Saxifragaceae)
18. 5: ?*Bletilla striata* (Thunb.) Rchb.f. (Orchidaceae)
18. 6: ?*Euphorbia helioscopia* L. (Euphorbiaceae)
18. 7: ?*Echinochloa crus-galli* (L.) P. Beauv. (Poaceae)
19. 1: *Pieris japonica* (Thunb.) D. Don (Ericaceae)
19. 2: ?Rosaceae or ?Symplocaceae
19. 3: *Thuja orientalis* L. (Cupressaceae)
20. 1: *Cinnamomum japonicum* Siebold (Lauraceae)
20. 2: *Juniperus rigida* Siebold & Zucc. (Cupressacae)
20. 3: *Rhus succedanea* L. (Anacardiaceae)
21. 0: *Cephalotaxus harringtonia* (Knight) K. Koch (Cephalotaxaceae)
22. 1: *Torreya nucifera* (L.) Siebold & Zucc. (Taxaceae)
22. 2: ?*Ilex rotunda* Thunb. or ? *Ilex integra* Thunb. (Aquifoliaceae)
23. 1: *Cycas revoluta* Thunb. (Cycadaceae)
23. 2a: *Camellia japonica* L. (Theaceae)
23. 2b: *Trochodendron aralioides* Siebold & Zucc. (Trochodendraceae)
24. 0: *Sciadopitys verticillata* (Thunb.) Siebold & Zucc. (Taxodiaceae)
25. 1: *Podocarpus macrophyllus* (Thunb.) Sweet (Podocarpaceae)
25. 2: ?*Pinus parviflora* Siebold & Zucc. (Pinaceae)
25. 3: *Deutzia crenata* Thunb. (Saxifragaceae)
25. 4: ?*Quercus dentata* Thunb., hybrid (Fagaceae)
26. 0: *Smilax china* L. (Smilacaceae)
27. 1: *Hibiscus tiliaceus* L. (Malvaceae)
27. 2: *Camellia sinensis* (L.) Kuntze (Theaceae)
28. 1: *Pteris multifida* Poir. (Pteridaceae)
28. 2: ?Caprifoliaceae
28. 3: *Artemisia indica* Willd. (Asteraceae)
28. 4: ?*Gnaphalium japonicum* Thunb. (Asteraceae)
29. 1: *Viola* sp. (Violaceae)
29. 2: *Oxalis corniculata* L. (Oxalidaceae)
29. 3: *Trachelospermum jasminoides* (Lindl.) Lem. (Apocynaceae)
30. 1: *Hydrangea scadens* (L.f.) Ser. (Saxifragaceae)
30. 2: *Rhus succedanea* L. (Anacardiaceae)
31. 0: *Broussonetia papyrifera* (L.) L'Hér. ex Vent. (Moraceae)
32. 1: *Machilus thunbergii* Siebold & Zucc. (Lauraceae)
32. 2: *Camellia japonica* L. (Theaceae)
32. 3: ?Myrtaceae
33. 0: *Nandina domestica* Thunb. (Berberidaceae)
34. 0: *Euonymus alatus* (Thunb.) Siebold (Celastraceae)
35. 0: *Campsis grandiflora* (Thunb.) K. Schum. (Bignoniaceae)
36. 1: *Zanthoxylum piperitum* DC. (Rutaceae)
36. 2: *Sium sisarum* L. (Apiaceae)
37. 1: *Quercus serrata* Thunb. (Fagaceae)
37. 2: *Eurya emarginata* (Thunb.) Makino (Theaceae)
37. 3: Indet.
37. 4: Indet.
37. 5: *Amelanchier asiatica* (Siebold & Zucc.) Endl. (Rosaceae)
38. 1: ?*Sambucus sieboldiana* Blume (Caprifoliaceae) or ?*Rhus trichocarpa* Miq. (Anacardiaceae)
38. 2: *Rhus succedanea* L. (Anacardiaceae)
38. 3: *Pieris japonica* (Thunb.) D. Don (Ericaceae)
39. 1: *Amelanchier asiatica* (Siebold & Zucc.) Endl. (Rosaceae)
39. 2: ?*Quercus glauca* Thunb. (Fagaceae)
39. 3: *Rhododendron* sp. (Ericaceae)
39. 4: *Kerria japonica* (L.) DC. (Rosaceae)
40. 1: ?*Disporum sessile* D. Don or ?*D. smilacinum* A. Gray (Liliaceae)
40. 2: ?Rosaceae or ?Primulaceae
40. 3: *Pittosporum tobira* (Thunb.) W.T. Aiton (Pittosporaceae)
41. 1: *Corydalis decumbens* (Thunb.) Pers. (Papaveraceae)
41. 2: *Podocarpus nagi* (Thunb.) Makino (Podocarpaceae)
42. 1: *Corydalis incisa* (Thunb.) Pers. (Papaveraceae)
42. 2: ?*Spiraea thunbergii* Siebold or ?*S. prunifolia* Siebold & Zucc. (Rosaceae)
42. 3: ?*Prunus glandulosa* Thunb. (Rosaceae)
42. 4: *Euonymus alatus* (Thunb.) Siebold (Celastraceae)
42. 5: *Stellaria media* (L.) Vill. (Caryophyllaceae)
43. 1: *Paulownia tomentosa* (Thunb.) Steud. (Scrophulariaceae)
43. 2: *Corydalis incisa* (Thunb.) Pers. (Papaveraceae)
43. 3: ?*Spiraea thunbergii* Siebold or ?*S. prunifolia* Siebold & Zucc. (Rosaceae)
43. 4: ?*Laurus latifolia* Thunb. (Lauraceae) or ?Aquifoliaceae
44. 1: Indet.
44. 2: ?*Spiraea thunbergii* Siebold or ?*S. prunifolia* Siebold & Zucc. (Rosaceae)
44. 3: ?Apiaceae
44. 4: *Stachyurus praecox* Siebold & Zucc. (Stachyuraceae)
44. 5: *Smilax china* L. (Smilacaceae)
44. 6: *Corydalis decumbens* (Thunb.) Pers. (Papaveraceae)
45. 1: *Acorus gramineus* Aiton (Araceae)
45. 2: ?Poaceae
45. 3: *Osmunda japonica* Thunb. (Osmundaceae)
45. 4: ?*Peucedanum terebinthaceum* (Fisch. ex Trevir.) Fisch. ex Turcz. (Apiaceae)
46. 1: ?Lauraceae
46. 2: ?Lauraceae
46. 3: *Onychium japonicum* (Thunb.) Kunze (Pteridaceae)

46. 4: ?Apiaceae
46. 5: *Acer palmatum* Thunb. (Aceraceae)
47. 1: ?*Quercus glauca* Thunb. (Fagaceae)
47. 2: *Spiraea cantoniensis* Lour. (Rosaceae)
47. 3: ?Rosaceae
47. 4: *Acer palmatum* Thunb. (Aceraceae)
47. 5: *Kerria japonica* (L.) DC. (Rosaceae)
48. 1: ?*Arisaema* sp. (Araceae)
48. 2: *Dicentra spectabilis* (L.) Lem. (Papaveraceae)
48. 3: *Acer palmatum* Thunb. (Aceraceae)
49. 1: *Trachelospermum asiaticum* (Siebold & Zucc.) Nakai (Apocynaceae)
49. 2: *Rhus sylvestris* Siebold & Zucc. (Anacardiaceae)
50. 1: ?*Rubus* sp. (Rosaceae)
50. 2: Indet.
50. 3: *Dioscorea quinqueloba* Thunb. (Dioscoreaceae)
50. 4: *Ilex latifolia* Thunb. (Aquifoliaceae)
51. 1: *Osmanthus fragrans* (Thunb.) Lour. (Oleaceae)
51. 2: *Ficus pumila* L. (Moraceae)
51. 3: *Illicium religiosum* Siebold & Zucc. (Illiciaceae)
51. 4: Indet.
52. 1: *Castanopsis cuspidata* (Thunb.) Schottky (Fagaceae)
52. 2: *Ilex chinensis* Sims (Aquifoliaceae)
52. 3: *Vaccinium bracteatum* Thunb. (Ericaceae)
53. 1: *Quercus glauca* Thunb. (Fagaceae)
53. 2: *Quercus acuta* Thunb. (Fagaceae)
53. 3: Indet.
53. 4: *Fatsia japonica* (Thunb.) Decne. & Planch. (Araliaceae)
54. 1: Indet.
54. 2: *Gardenia jasminoides* J. Ellis (Rubiaceae)
54. 3: Indet.
54. 4: *Castanopsis cuspidata* (Thunb.) Schottky (Fagaceae)
55. 0: *Neolitsea sericea* (Blume) Koidz. (Lauraceae)
56. 1: *Mallotus japonicus* (Thunb.) Müll.Arg. (Euphorbiaceae)
56. 2: *Viburnum dilatatum* Thunb. (Caprifoliaceae)
56. 3: *Corylopsis* sp. (Hamamelidaceae)
57. 1: Indet.
57. 2: ?*Spiraea thunbergii* Siebold or ?*S. prunifolia* Siebold & Zucc. (Rosaceae)
58. 1: *Amelanchier asiatica* (Siebold & Zucc.) Endl. (Rosaceae)
58. 2: ?*Prunus glandulosa* Thunb. (Rosaceae)
58. 3: *Eurya japonica* Thunb. (Theaceae)
58. 4: *Stachyurus praecox* Siebold & Zucc. (Stachyuraceae)
59. 1: ?*Symplocos lucida* (Thunb. ex Murray) Siebold & Zucc. (Symplocaceae)
59. 2: *Pittosporum tobira* (Thunb.) W.T. Aiton (Pittosporaceae)
59. 3: *Myrica rubra* (Lour.) Siebold & Zucc. (Myricaceae)
59. 4: *Skimmia japonica* Thunb. (Rutaceae)
60. 1: Indet.
60. 2: *Zanthoxyllum piperitum* (L.) DC. (Rutaceae)
60. 3: *Illicium religiosum* Siebold & Zucc. (Illiciaceae)
61. 1: *Acorus gramineus* Aiton (Araceae)
61. 2: ?*Spiraea prunifolia* Siebold & Zucc. (Rosaceae)
61. 3: Indet.
62. 1: *Elaeagnus pungens* Thunb. (Elaeagnaceae)
62. 2a: ?*Rhododendron kaempferi* Planch. (Ericaceae)
62. 2b: *Rhododendron scabrum* G. Don (Ericaceae)
62. 2c: *Rhododendron macrosepalum* Maxim. (Ericaceae)
62. 3: *Kerria japonica* (L.) DC. (Rosaceae)
63. 1: *Podocarpus nagi* (Thunb.) Makino (Podocarpaceae)
63. 2: *Pittosporum tobira* (Thunb.) W.T. Aiton (Pittosporaceae)
63. 3: *Illicium religiosum* Siebold & Zucc. (Illiciaceae)
64. 1: ?*Aristolochia* sp. or ?*Asarum* sp. (Aristolochiaceae)
64. 2: ?*Kadsura japonica* (L.f.) Dunal (Magnoliaceae)
64. 3: *Gardenia jasminoides* J. Ellis (Rubiaceae)
64. 4: Indet.
64. 5: *Rhus javanica* L. (Anacardiaceae)
65. 1: Indet.
65. 2: *Centella asiatica* (L.) Urb. (Apiaceae)
65. 3: Indet.
65. 4: ?Lauraceae
65. 5: *Gardenia jasminoides* J. Ellis (Rubiaceae)
65. 6: ?Lauraceae
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